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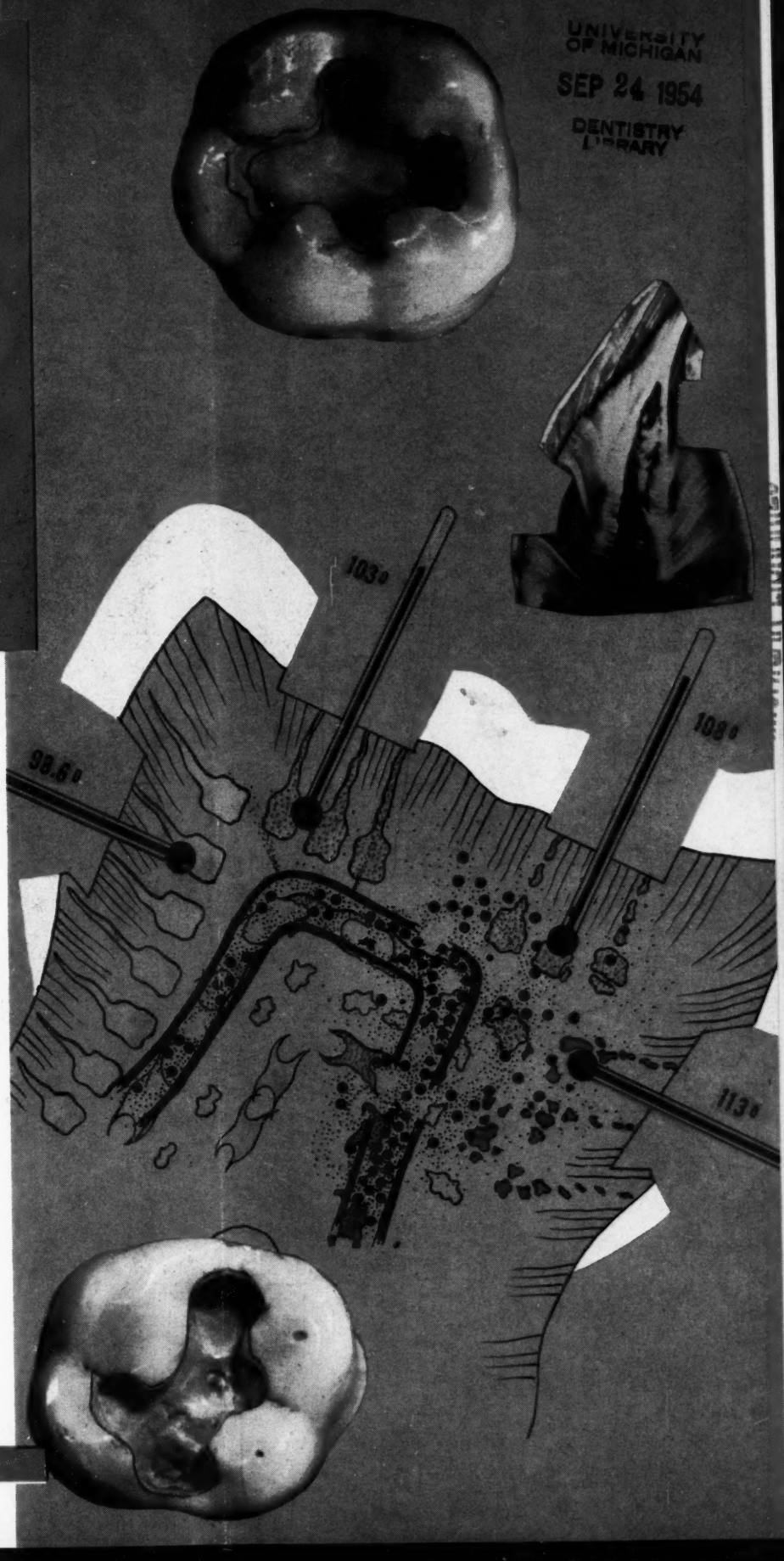

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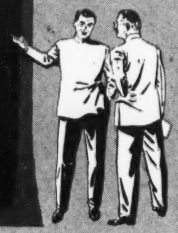

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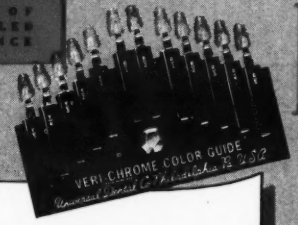

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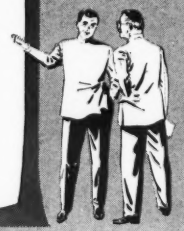

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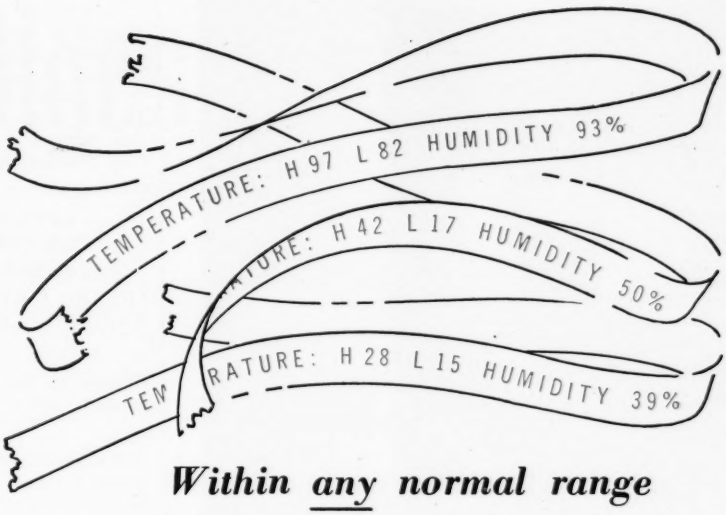

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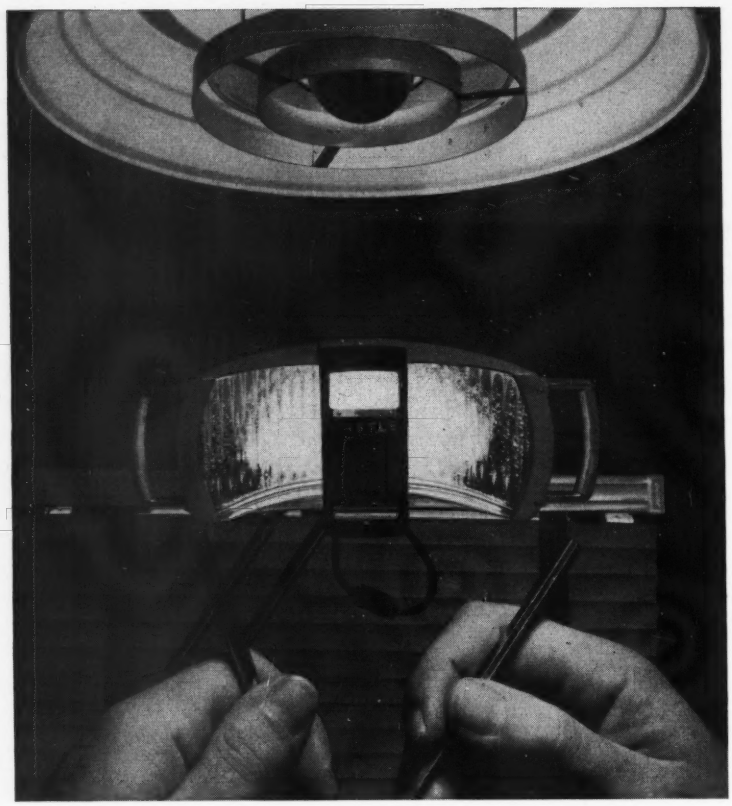

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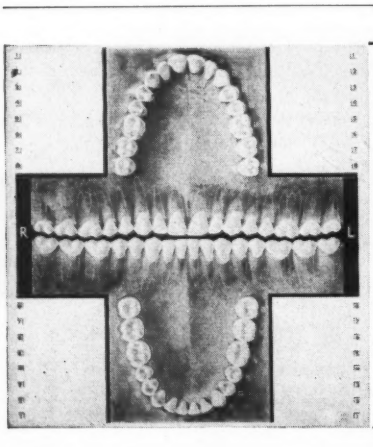

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EDWARD J. RYAN, B.S., D.D.S., Editor
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CAVITY PREPARATION

With and Without AIRBRASIVE

SUMTER S. ARNIM, B.A., D.D.S., Ph.D.,
RUSSELL K. SMITH, D.D.S., M.S.,
and LON V. PORTER, B.A., D.D.S., Houston, Texas

DIGEST

By the use of a thermocouple it was shown that the temperature of the dental pulp was elevated on the average of 10° Fahrenheit in 12 seconds when rotary instruments were used in cavity preparation.

Airbrasive technique excised tooth structure with no appreciable rise in temperature and without disturbing vibration or noise.

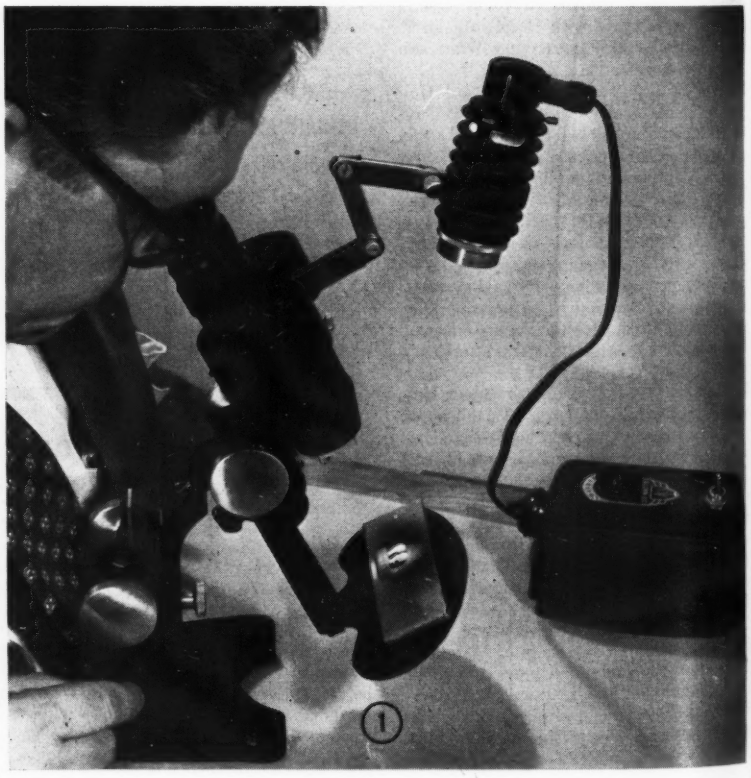
Of 233 patients queried 228 expressed a preference for the airbrasive method of cutting tooth structure to cavity preparation with the dental bur.

Method of Conducting Studies

Cavity preparations were completed in the laboratory and clinic by postgraduate students and instructors.

Typical Class I operations were performed on extracted teeth by each dentist using cutting instruments, burs, diamonds, or stones with the technique usually employed in his office. Similar operations were performed using airbrasive alone and using airbrasive in combination with regular instruments.

Record of Time Required—Rec-

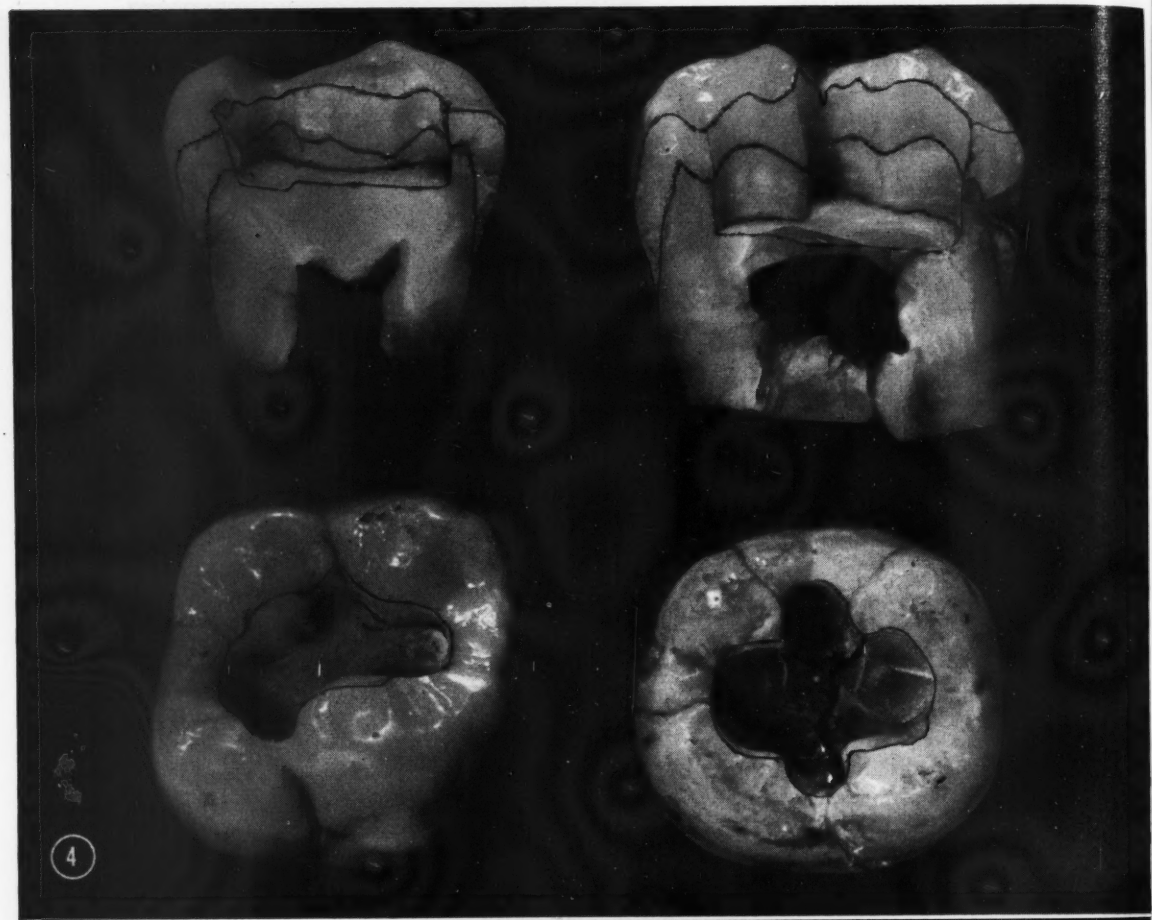


ords were kept of the time required for each operation and the teeth were studied with dissecting microscopes before and after splitting. Studies were done to obtain data on heat, vibration, and noise produced during excision of enamel and dentin with various techniques.

Details of Treatment Recorded—Records were also made of the length of time required to place the rubber dam and operate on carious teeth in patients' mouths. Teeth were also treated in the patient's mouth with conventional instruments and with airbrasive respectively. They were later extracted for orthodontic purposes, sectioned for microscopic study and photographs were made of the cavity preparations with the corresponding pulpal changes. The following illustrations show the results obtained.

Analysis of Figure One

This is a photograph of a dissecting microscope used for study of a tooth that had been operated on. The relative magnification obtained is



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LABORATORY PROGRESS MEASUREMENT

(6) CLASS I OPERATIONS - TIME CHART

INSTRUMENTS	NO. TEETH	AVERAGE TIME IN MINUTES	MAXIMUM TIME IN MINUTES	MINIMUM TIME IN MINUTES
AIRBRASIVE TECHNIC ONLY	73	3.7	11.5	1.25
AIRBRASIVE TECHNIC & CONVENTIONAL INSTRUMENTS	59	5.2	22	1.25
CONVENTIONAL INSTRUMENTS ONLY	77	6.7	19	1.0

LABORATORY PROGRESS MEASUREMENT

(7) (CLASS I OPERATIONS)

UNSATISFACTORY

Undermined Enamel - Remaining Caries - Too Shallow - Too Deep

TOTAL TEETH OPERATED	ROTARY INSTRUMENTS	AIRBRASIVE	AIRBRASIVE & INSTRUMENTS
186	48	70	68
No. with smooth walls, sharp angles and flat floors	0	0	9

SATISFACTORY

TOTAL TEETH OPERATED	ROTARY INSTRUMENTS	AIRBRASIVE	AIRBRASIVE & INSTRUMENTS
69	33	17	19
No. with smooth walls, sharp angles and flat floors	2	0	5

TOTALS

255	81	87	87

seen in Figure 2. This preparation was made, using airbrasive technique only, by a postgraduate student on the third day of the course. The use of dissecting microscopes for studying preparations is helpful and enlightening.

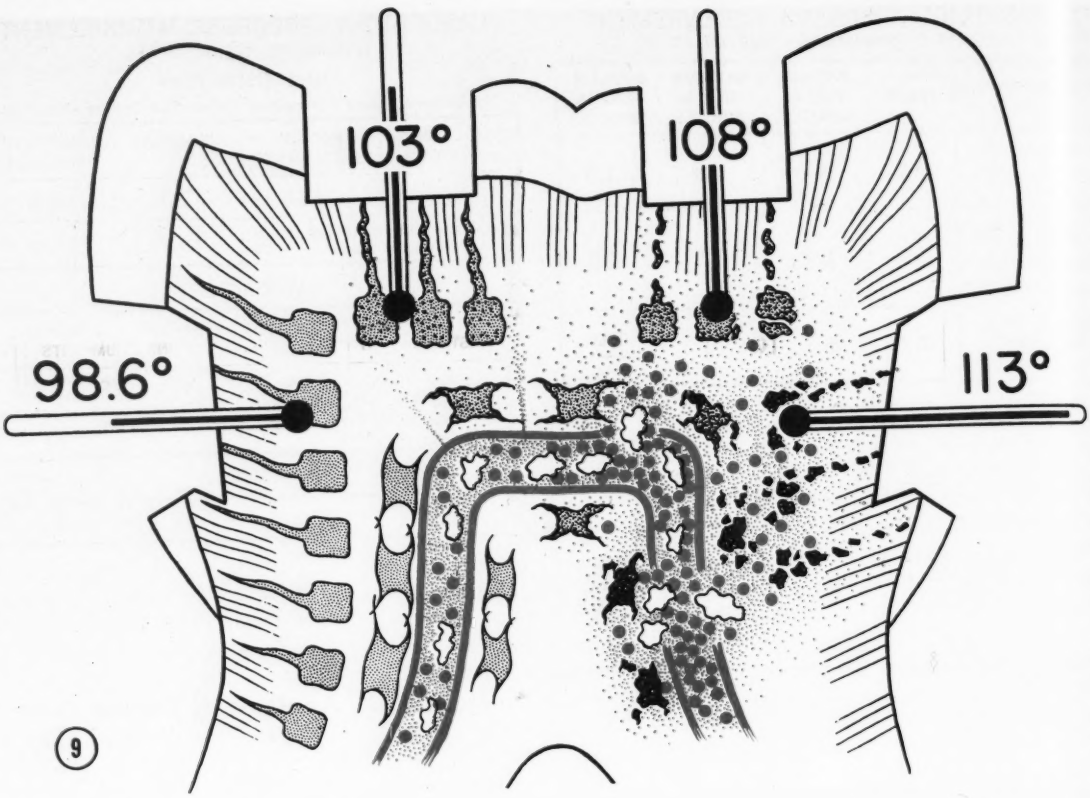
Analysis of Figure Three

This illustration shows whole and split teeth operated on with conventional instruments only. Examples of the best results obtained are on the left and average results are on the right. Line angles, margins and dentino-enamel junctions are emphasized by tracings on the teeth prior to photographing. The tracings help visualize the margins but they do not reproduce them exactly.

Analysis of Figure Four

Pictures are shown of whole and

(8)



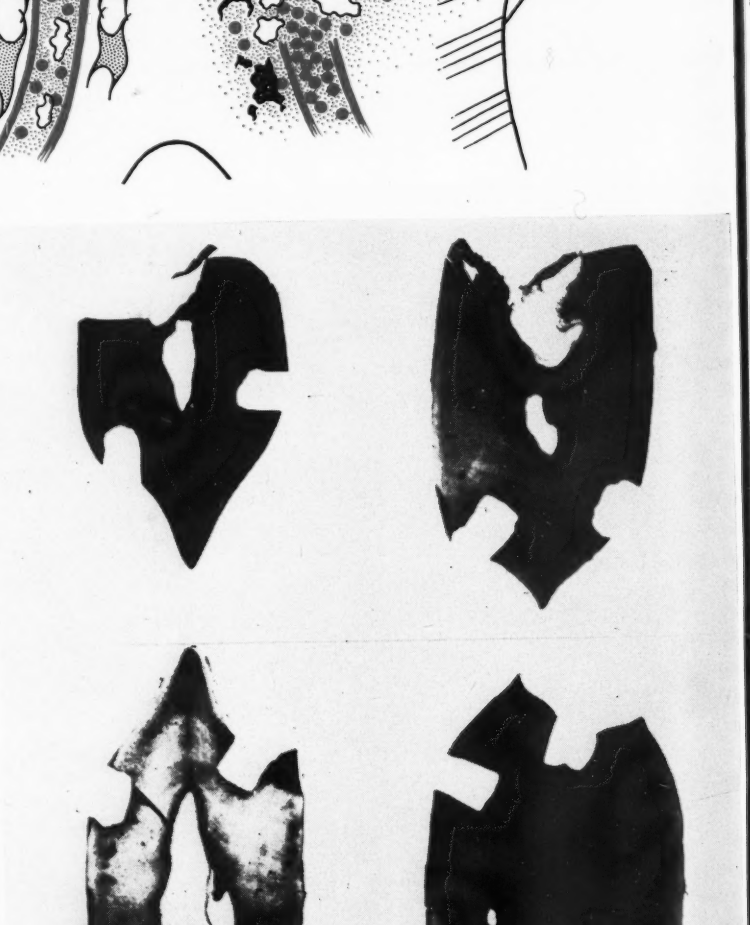
split teeth operated on with airbrasive technique in conjunction with other instruments. The best operations are on the left and average performances are on the right. These were done by postgraduate students on the fourth day.

Analysis of Figure Five

Teeth operated on with airbrasive only. The best examples are on the left; average results are seen on the right. They were made by postgraduates on the third day.

Analysis of Figure Six

This is a chart summarizing a laboratory study in which the number of teeth operated on, the technique used, and the time required was recorded. Extracted molar teeth were used and the excisions were made at the laboratory bench holding the teeth with the fingers. Seventy-seven practicing dentists participated in this exercise.



Analysis of Figure Seven

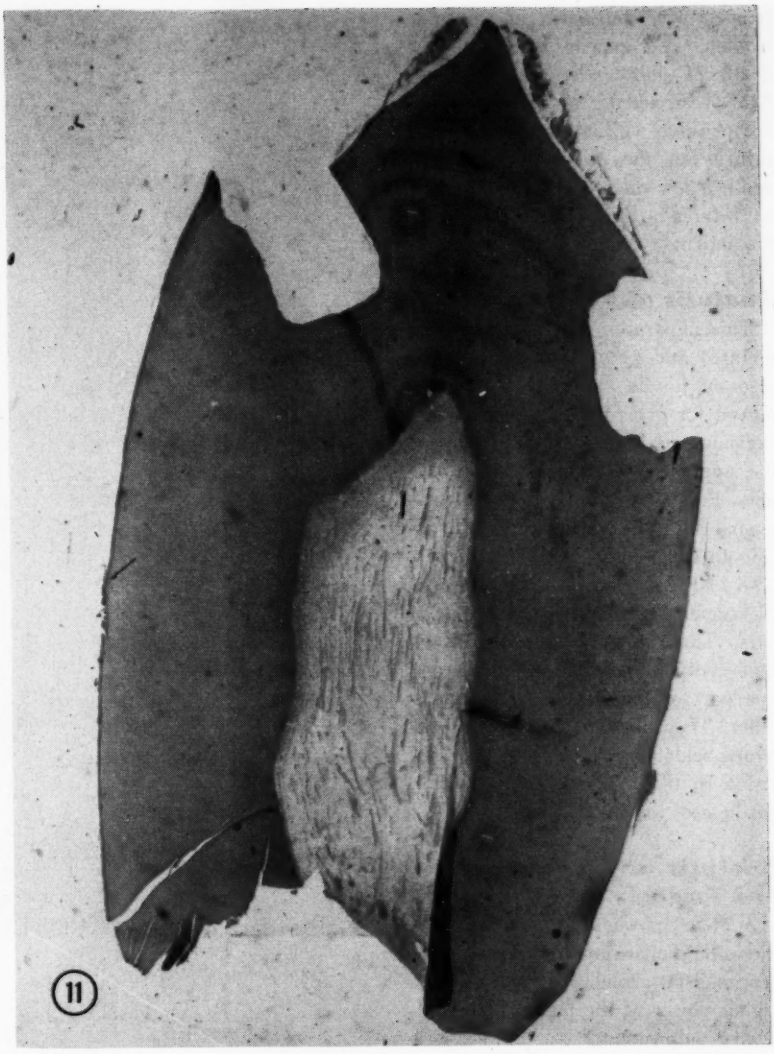
This is a summary of a laboratory study made with the cooperation of 87 dentists each of whom prepared a Class I cavity in a molar tooth with rotary instruments, airbrasive, and airbrasive in combination with rotary instruments. Six of the teeth operated on with rotary instruments were lost. All operated teeth were divided into two groups, unsatisfactory (186), satisfactory (69). The operations were judged unsatisfactory when any of the following were present: (1) undermined enamel, (2) remaining caries, (3) preparation too shallow, (4) preparation too deep. The cavities were examined also to see if the walls were smooth, angles sharp, and floors flat. Few were found meeting dental school standards in these categories.

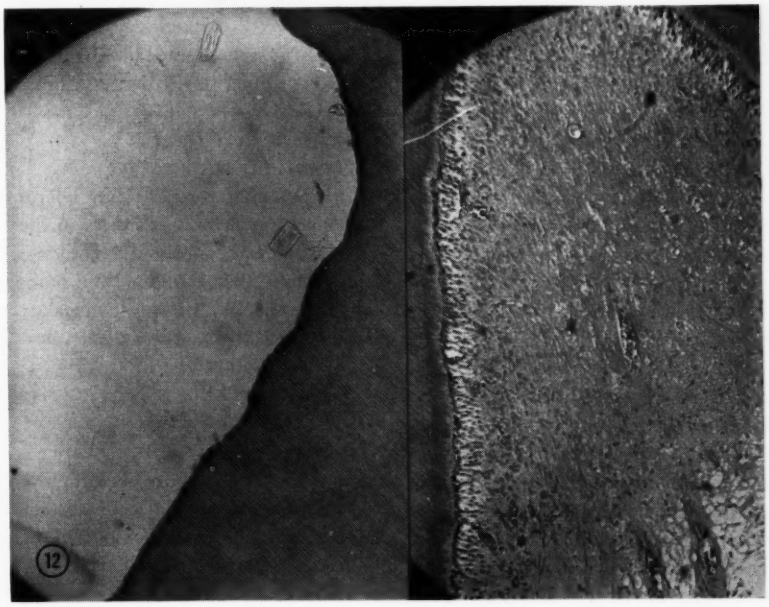
Analysis of Figure Eight

A dentist is revealed studying the surgical trauma produced during excision of the hard tissues of the teeth. Approximately 450 teeth were operated on in this study and 150 dentists participated. A thermocouple was placed in the pulp chamber and readings of the rise in temperature of the pulp during drilling were recorded. The average rise with rotary instruments was 10° Fahrenheit in 12 seconds, the minimum 0° Fahrenheit and the maximum 35° Fahrenheit. At the same time the temperature was recorded, bone-conducted noise caused by the grinding was heard at the patient's level through a contact microphone, pick-up, and speaker. The vibrations produced were also transmitted to the screen of an oscilloscope where they were seen as a series of moving waves. Airbrasive technique excised tooth substance with no rise in temperature, vibration, or noise.

Analysis of Figure Nine

This is a graphic illustration emphasizing the effect of temperature rise beyond physiologic tolerance upon the dental pulp. Rise in pulp temperature is indicated by the thermometers in the cavities. The first changes noted at 103° Fahrenheit result in cloudy swelling, edema, and slight hyperemia. With increase in





temperature, congestion and cellular exudate also appear. It is thought death of pulp cells begins around 113° Fahrenheit. All these changes are possible without permanent pulp injury but they may lead to pulp death a few days to years later with or without symptoms recognized by the patient.

Analysis of Figure Ten

This illustration is composed from pictures and sections of teeth operated on in the mouth and later removed for orthodontic purposes. The excisions made with airbrasive are in the upper left and lower right corners, those with conventional instruments, 33 1/2 inverted cone bur, 56 smooth fissure bur, 12-5-23 hoe, and 15-8-14 R & L enamel hatchets are in the upper right and lower left corners. These pictures reveal clearly that cavity walls vary markedly from one part of the excised area to another. They also show that our best efforts seldom produce geometric precision in the finished operation, regardless of the instrument used.

Analysis of Figures Eleven and Twelve

A low power photomicrograph shows pulp changes produced by conventional instruments; Figure 12 is a higher power of the pulpal floor and related pulp tissue.

Analysis of Figure Thirteen

A comparable picture of the pulp of another bicuspid from the opposite side of the same patient's mouth. This tooth was excised with airbrasive only. Pulp changes are less severe even though the excision is deeper and approaches the pulp more closely.

Analysis of Figure Fourteen

Pictures of ground sections of extracted teeth operated on with conventional instruments and airbrasive respectively. Enamel margins, cavity walls, floor and line angles are accurately revealed by this technique of sectioning and magnifying. Can you guess which were done with airbrasive? The answer is on page 410. Should the reader think these preparations are done carelessly, it is suggested he examine some of his own cavity preparations in the same fashion.

Analysis of Figure Fifteen

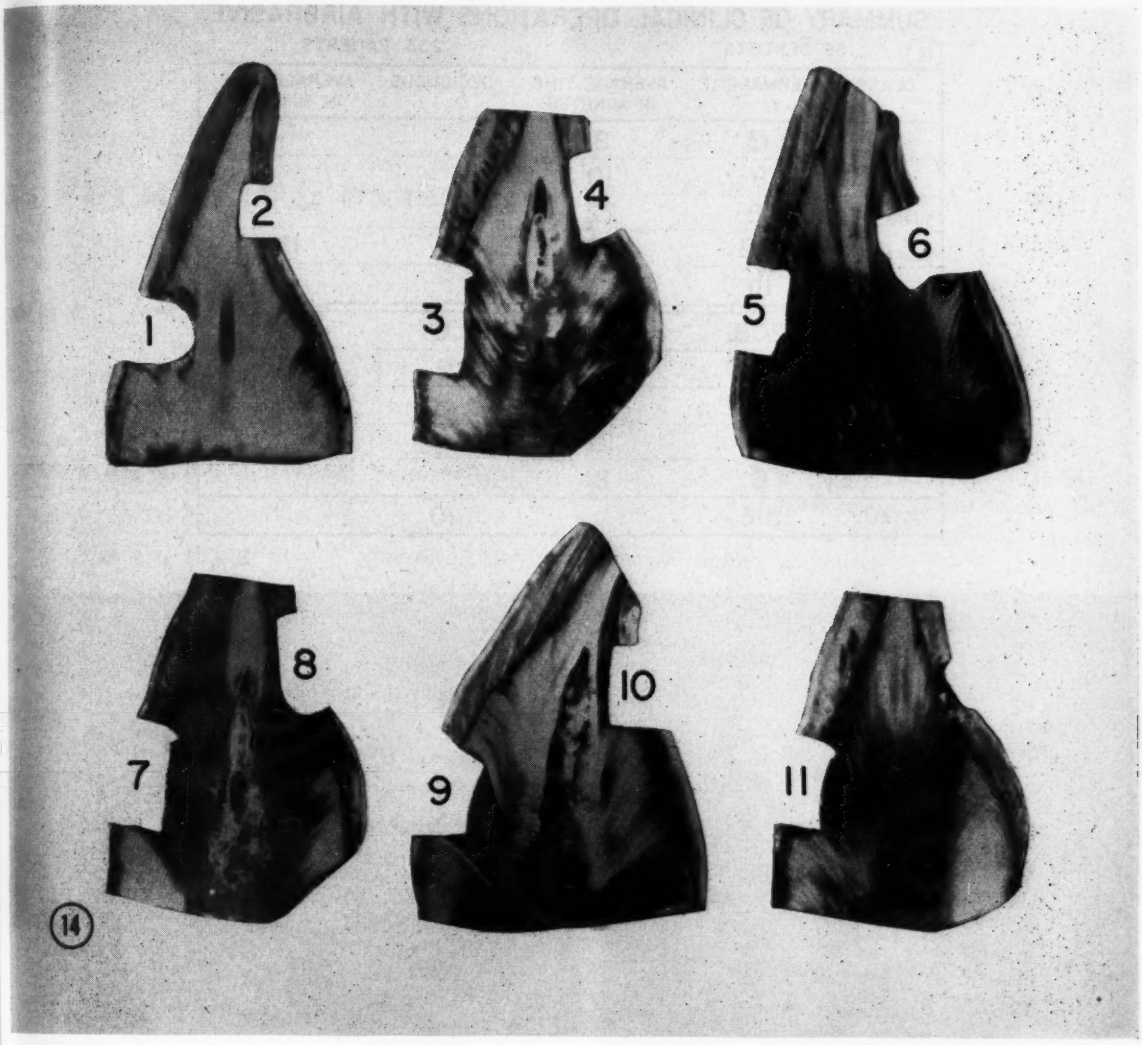
This is a chart summarizing operations performed by 59 dentists in the clinic using airbrasive only. The type of operation, the tooth, the total number of respective or permanent or deciduous teeth treated, and the number of patients are given.

Analysis of Figure Sixteen

The time required to perform the operations in the clinic is presented. No pulps were exposed and 228 of the 233 patients expressed a preference for this type of cutting to the dental bur. Many felt some pain and some experienced severe pain. The recorded time included the time required for placing the rubber dam and making the cavity preparation. It took one dentist 45 minutes to adjust and secure the dam on one patient. As the course progressed the postgraduate operators soon recovered their original skill with the rubber dam and time for placement seldom exceeded five minutes.

Analysis of Figure Seventeen

Photographs of extracted teeth operated on by Robert Black (the inventor of the airdent) after ten years' experience with airbrasive. The operations were performed in the laboratory using airbrasive only and are typical of the skillful operator.



Summary

This presentation describes and illustrates certain experiences and results concerning excision of enamel and dentin with conventional and airbrasive techniques. The collection of data is intended to provide a clear, accurate, and unbiased account of the experiences described. The series of observations are presented for careful consideration. The pictures tell the story.

University of Texas, Dental Branch.

(*Figs.* 16 *and* 17 *on page* 396)

(15) TEETH OPERATED WITH AIRBRASIVE

59 DENTISTS — 233 PATIENTS

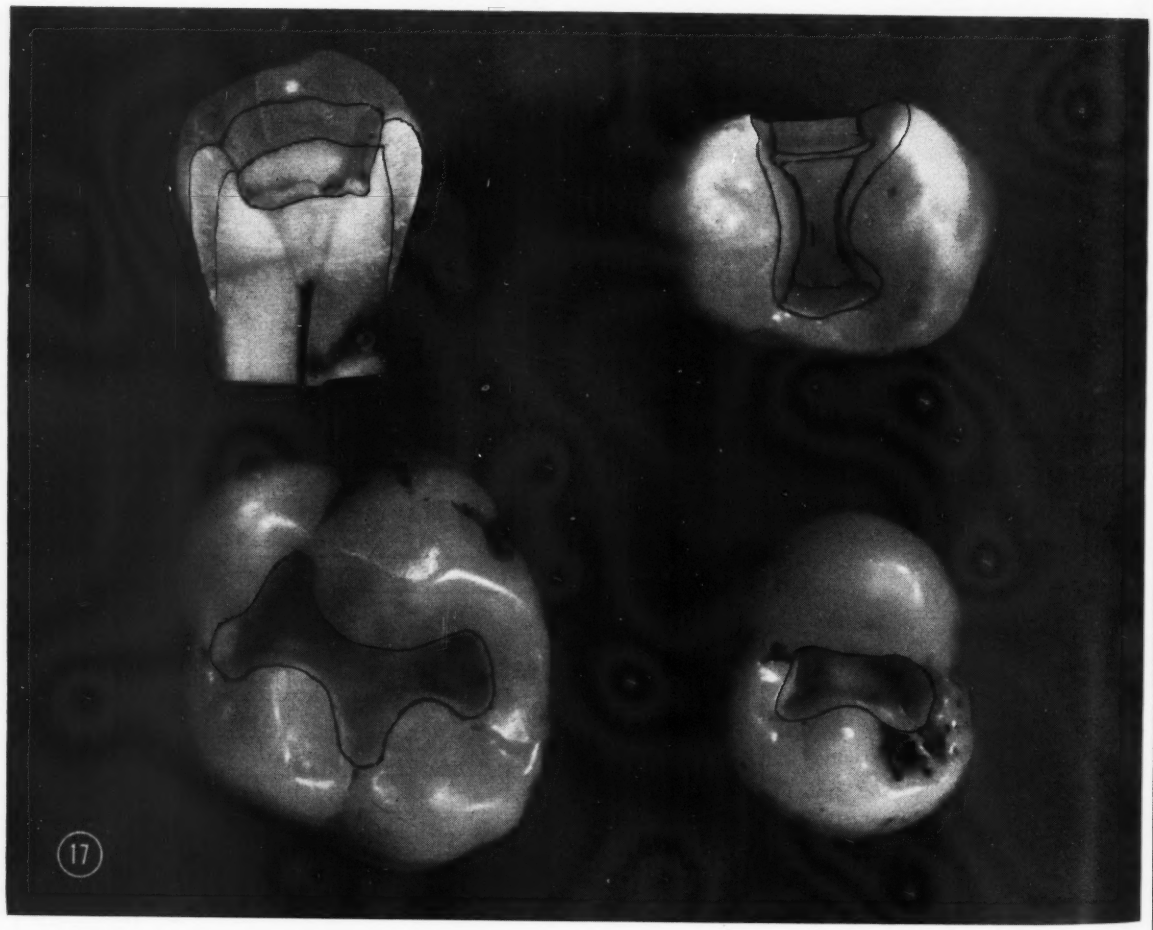
CLASS	RIGHT UPPER								LEFT UPPER							
V		3			2	4	3				1					
III							3	3	2	1						
SURFACE 3 II			1	7	1							4	5			
SURFACE 2 II		5	14	12	2	10						5	6	17	3	
I	3	16	28	8	3							8	4	25	14	2
TOOTH	8	7	6	5 E	4 D	3 C	2 B	1 A	A 1	B 2	C 3	D 4	E 5	6	7	8

TOOTH	RIGHT LOWER								LEFT LOWER							
	8	7	6	5 E	4 D	3 C	2 B	1 A	A 1	B 2	C 3	D 4	E 5	6	7	8
I	2	38	31	14 1	12							2 13	3 14	40	38	6
SURFACE 2 II		4	7	8	2							1 10	1 13	9	6	
SURFACE 3 II		2	2	3	1								4	6		
III											2					
V				2						1	1	1	1			

SUMMARY OF CLINICAL OPERATIONS WITH AIRBRASIVE

(16) 59 DENTISTS 233 PATIENTS

CLASS	PERMANENT	AVERAGE TIME IN MINUTES	DECIDUOUS	AVERAGE TIME IN MINUTES
V	13	8		
III	9	10		
3 SURFACE II	18	22		
2 SURFACE II	72	17	2	15
I	111	10		
I	208	10	6	5
2 SURFACE II	59	17	2	15
3 SURFACE II	18	22		
III	2	10		
V	6	8		
TOTALS	516		10	



(17)

SUPPURATIVE OSTEITIS

after Chicken-pox

JOSEPH H. BAKER, D.M.D., Haverhill, Massachusetts

DIGEST

This case report describes in detail the treatment used in a case of oral complication after chicken-pox.

History

The patient was an eleven-year-old girl, active, healthy, and well developed. Four months previously she had contracted chicken-pox. She had had several intraoral chicken-pox lesions. Shortly after recovering the right mandibular first molar became painful; swelling occurred adjacent to this tooth. After four months of desultory treatment the patient was referred to me.

Examination

(1) A swelling the size of an English walnut was visible externally along the border of the right mandible extending from the bicuspid nearly to the angle of the jaw. The mass was moderately hard with slight fluctuation.

(2) Intraoral tissue in the buccal fold was purplish with gingival swelling which nearly obscured the first permanent molar and first deciduous molars.

(3) A small pinhole opening was visible in the swollen purplish area. No exudate was noticeable from this fistula even on gentle pressure.

Roentgenographic Results — X-ray pictures revealed a radiolucent area involving both roots of the permanent molar but centered on the mesial root. An occlusograph showed dense tissue extending 1 centimeter lateral to the mandible.

Laboratory Findings — A laboratory report contained the following information: (1) Streptoccocus viridans, (2) Staphylococcus albus, (3) no malignancy.

Diagnosis — Suppurative osteitis following secondary infection of chicken-pox lesion.

Treatment

(1) The area was incised under xylocaine.

(2) Dense cheese-like material which filled a cystic space involving the buccal tissue and the lateral border of the mandible had destroyed a circular area about 15 millimeters in diameter and penetrated to such depth that the roots of the permanent molar were visible. Toward the distal the erosion was deeper and the mandibular canal was exposed.

(3) Specimens of the cheesy mass and of tissue were sent to the laboratory for examination.

(4) The area was curetted, irrigated with chlorazine, then with chloresium; a wick of iodoform gauze was inserted.

(5) The patient was seen every two days for four weeks.

(6) The wound was irrigated and the wick-drain renewed each visit for two weeks.

(7) Regeneration of tissue was noticeable in four days when the denuded mandibular bone regained its periosteum.

(8) The wound healed as a cul de sac. The depression was therefore incised, the invading epithelium stripped away, and the opening closed with two sutures.

Postoperative Course

Healing was uneventful and complete. X-ray pictures six months later showed complete recovery of bone. The permanent molar is vital and normal.

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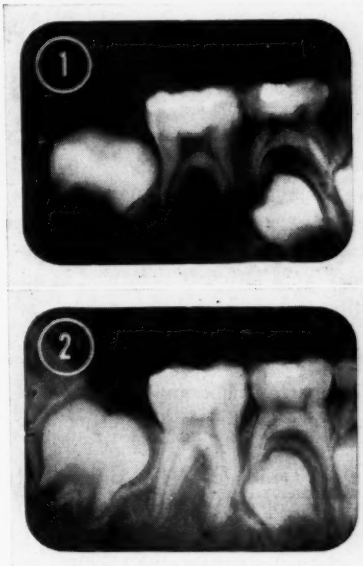


1. ***Shows condition at time the patient came for treatment.***

2. ***Six months after treatment.***

Rehabilitated CLEFT PALATE *Patient*

STANLEY RAYNOR, D.D.S., (R), USPHS, Chillicothe, Ohio

DIGEST

The patient in this case history ascribed much of his difficulty in social adjustment to his self-consciousness over a congenital facial deformity. Step-by-step directions are given in the article for the procedure used in construction of an appliance which improved the patient's speech and appearance.

Case History

The patient, a twenty-eight-year old white male, was the second in a family of fourteen children, six of whom were living. Eight had died in infancy from congenital disorders. The subject stated that most of the eight who died were deformed to some degree. Three of the six living children were afflicted with harelip and cleft palate; the other two were disfigured more severely than the subject. Some of the brothers and sisters who died in infancy were seriously deformed in addition to harelip and cleft palate.

Social Difficulties—The patient believed his deformity to be a source of embarrassment and the cause of numerous problems in adjustment to life.

Past Treatment—The patient had had two operations for the harelip and still had a slight cleft and experienced great difficulty with mastication and speech. He was honorably discharged from the Army due to physical disability existing prior to entry into the Service; namely, cleft palate.

Treatment

At the preliminary examination it was decided to retain all of the upper posteriors for the purpose of providing retention for the partial denture. Rests were prepared on the bicuspids and molars and sharp cusps on all the teeth were removed with stones and sandpaper discs.

Procedural Steps— A preliminary impression was taken of both arches with alginate impression material. A perforated metal tray was used. The models were poured and stone casts obtained. The lower impression was used as a model to obtain occlusion for the uppers. The following steps were then taken:

1. A shellac baseplate was adapted to the upper stone cast covering the palate area, edentulous areas, and the cleft. A low heating compound was used to register the deficient areas.

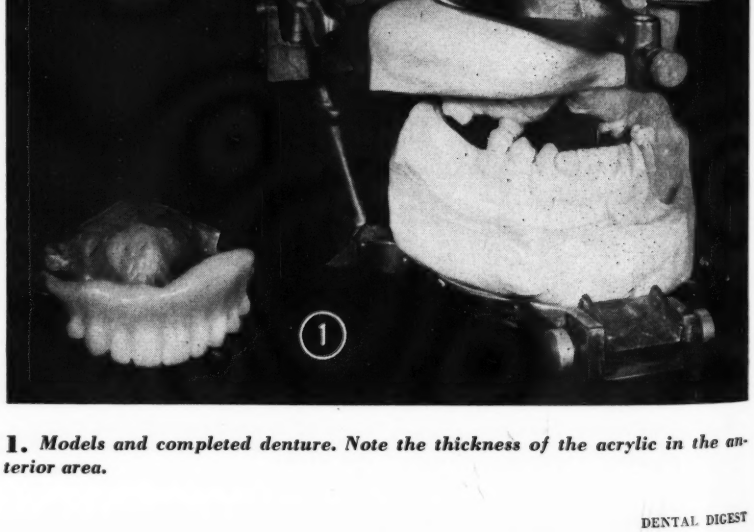
2. A paste impression of the deficient areas was taken. Excess paste was removed after it hardened. When this was accomplished satisfactorily the baseplate was reinserted into the mouth.

3. A large perforated metal tray was selected to fit the dental arches. The tray was filled with alginate material and the impression was taken with the shellac baseplate in position in the mouth.

4. When set, the alginate impression was removed with the baseplate sealed into it. The impression was poured in stone. This supplied the final model.

This technique provided accurate reproduction of the soft tissues which were not displaced.

Final Steps—The stone cast was surveyed and a metal alloy framework was made using clasps with oc-



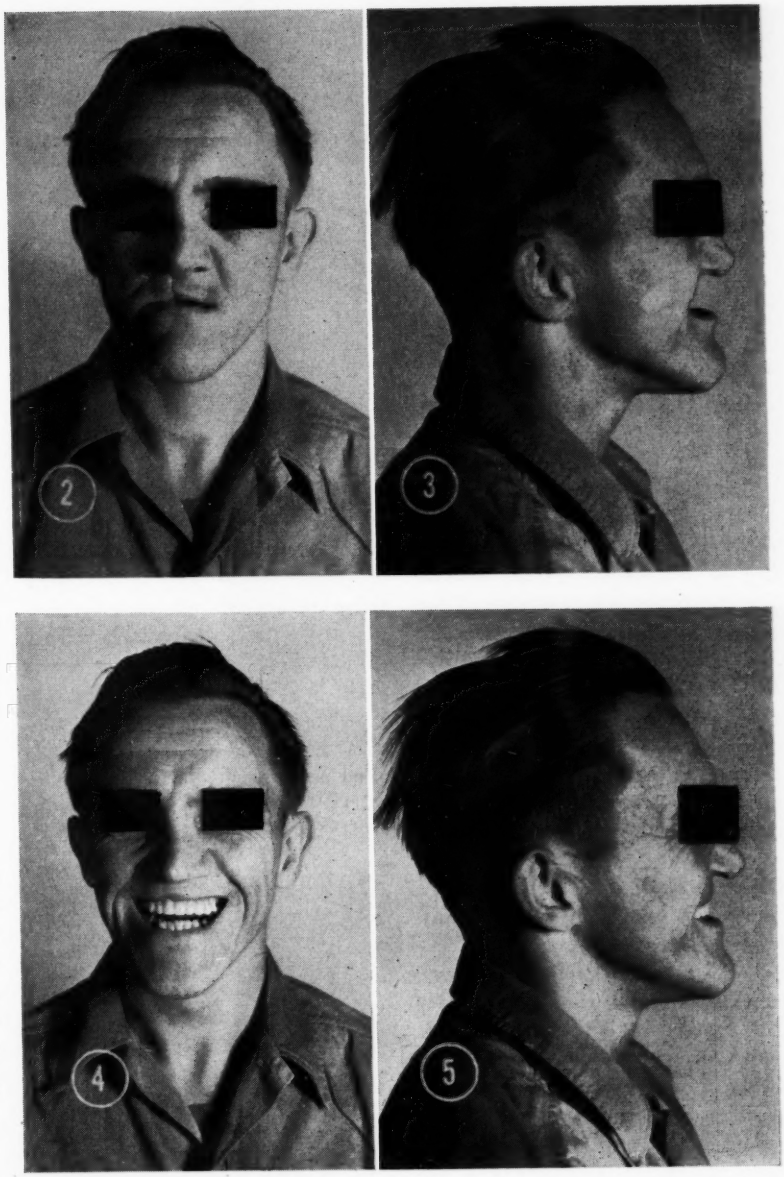
1. ***Models and completed denture. Note the thickness of the acrylic in the anterior area.***

2. ***Front view of the patient before rehabilitation.***

3. ***Profile view of the patient before rehabilitation.***

4. ***Front view after rehabilitation.***

5. ***Profile view after rehabilitation.***



clusal rests. A shellac baseplate was made with wax which extended labially and buccally to contact the mandibular teeth upon closure. The casts were mounted on a Gysi articulator. The teeth were set up on a tip-to-tip relationship.

The teeth were tried in the patient's mouth and checked. They were then processed in the usual way.

Severe Mandibular Prognathism—The appliance was constructed as described because of the extreme overclosure of the mandible which allowed the chin to swing upward and forward. Overclosure is a direct result of lack of growth of the maxilla in its lateral and downward and forward directions.[1]

Summary

The patient's speech has been markedly improved and he is no longer as conscious of his defect as previously. It was thought that this man's problem in adjustment was largely attributable to his extreme sensitiveness about his facial deformity. The appliance constructed has ben a valuable adjunct to improving his social adjustment.

Federal Reformatory.

[1]*Yearbook of Dentistry* 381, 1950.

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The Use of ACRYLIC *Instead of a Cast Core in the* DOWEL CROWN *Technique*

L. RUSH BAILEY, D.M.D.,*
and EDWIN M. SPEED, B.A., D.D.S.

DIGEST

This report describes a simplified technique in the use of self-curing or autopolymerizing acrylic for the preparation designed for plastic or porcelain crowns on non-vital teeth. This procedure, by eliminating the wax-up and casting of a gold core, reduces chair and laboratory time. For purposes of comparison the conventional and the simplified methods are presented.

Conventional Method

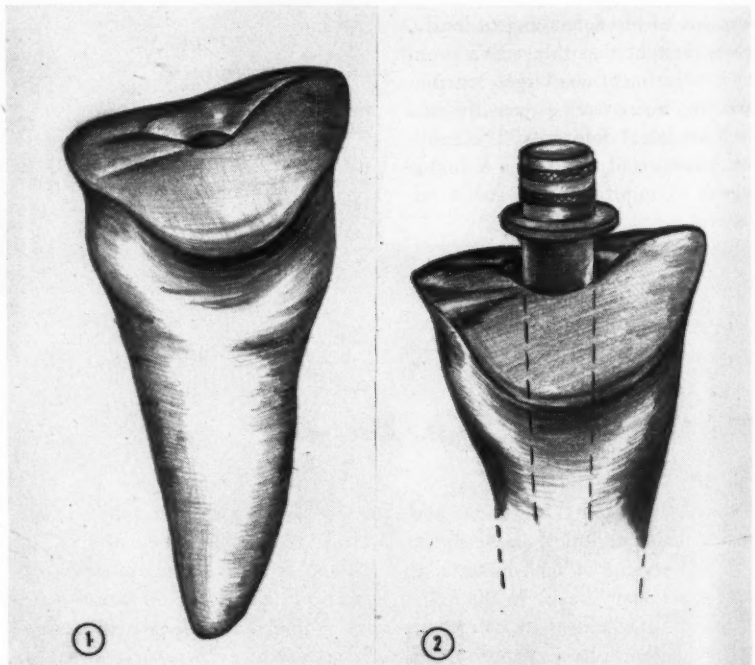
The following are the steps usually taken:

1. All caries is removed and root canal therapy is performed.
2. The enamel and dentin are reduced forming a typical preparation insofar as sound tooth structure will allow.
3. A 5-millimeter shoulder is prepared about ½ millimeter beneath the free gingival margin.
4. A dowel pin is fitted into the canal, an impression is taken of the preparation, a die made, and the desired preparation is waxed on the die.
5. The waxed preparation is cast in gold to the dowel pin and the finished product is cemented into place on the tooth.

Acrylic Method

1. All caries is removed from the tooth and root canal therapy is performed.
2. The entire crown of the tooth is reduced to ½ millimeter incisally to the cementoenamel junction. Normally this would result in the tooth being cut down to just below the margin of the free gingiva. The incisal section should be cut perpendicular to the long axis of the root (Fig. 1).
3. The coronal part of the root canal is opened and a dowel pin is fitted and cemented into place (Fig. 2).
4. With the aid of cotton rolls and warm air the field is kept dry; self-curing acrylic is painted on the tooth and dowel pin. An excess is applied so that it may be reduced to the desired restoration. The Nealon[1] brush technique is followed in adding the acrylic (Figs. 3 and 3a).
5. The choice of a dentin shade acrylic results in a natural-looking preparation and eliminates the pos-

[1]Nealon, F. H.: Acrylic Restorations; Operative Non-Pressure Procedure, *J. Pros. Dent.* **2**:513-527 (July) 1952.



1. ***Shows preparation of the root.***

2. ***Dowel in position in the root.***

*Professor of Dentistry, University of Alabama School of Dentistry.

sibility of the yellow color of the gold altering the shade of the finished crown.

6. After polymerization of the acrylic has been completed a conventional preparation is cut with medium sandpaper discs. Polymerization usually takes twenty to thirty minutes for completion (Fig. 4). This can be ascertained by testing the acrylic hardness with a hand instrument. The preparation may be polished with a fine sandpaper disc or a fine pumice paste.

7. The completed preparation should be treated as any other jacket crown preparation (Fig. 5).

Advantages

The modified procedure described has the following advantages:

1. Laboratory time and expense in waxing and casting the gold core is eliminated.

2. The preparation has a shade comparable to a crown preparation on a vital tooth.

3. A preparation can be made in one visit and takes only slightly more time than a vital tooth preparation.

4. The preparation is more economical because of time and materials saved.

Comments

The procedure, which was evolved after laboratory trial, has been successfully completed in the cases of two young adult male patients.

A revision of this procedure, under observation at present, is the completion of the crown by the "paint on" method with the proper enamel shade acrylic. With this procedure the entire operation may be completed in one sitting.

Summary

A procedure has been described whereby a jacket crown preparation on a pulpless tooth can be made in one sitting by substituting self-curing acrylic for gold in the construction of the core. Several advantages were listed.

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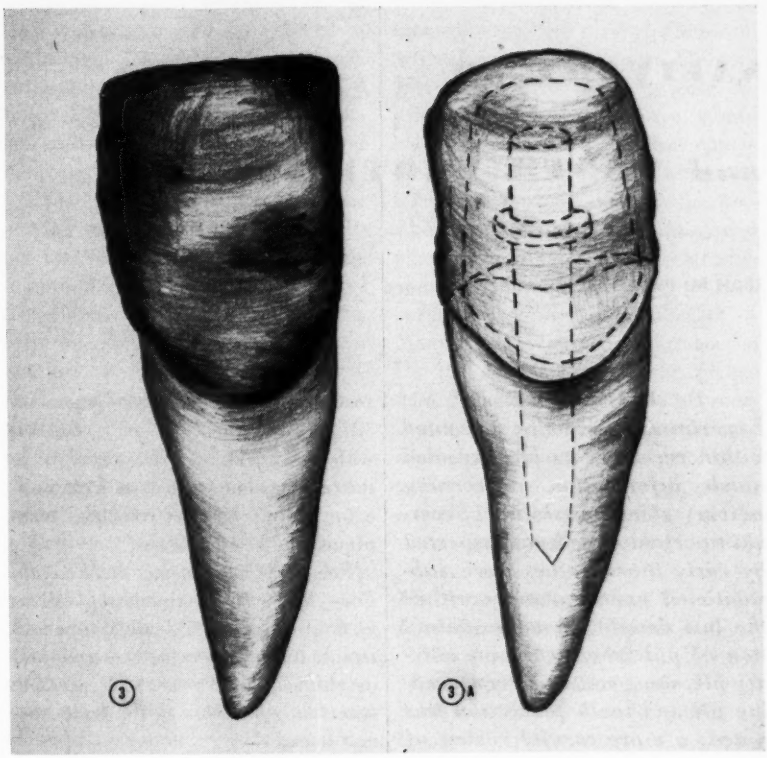
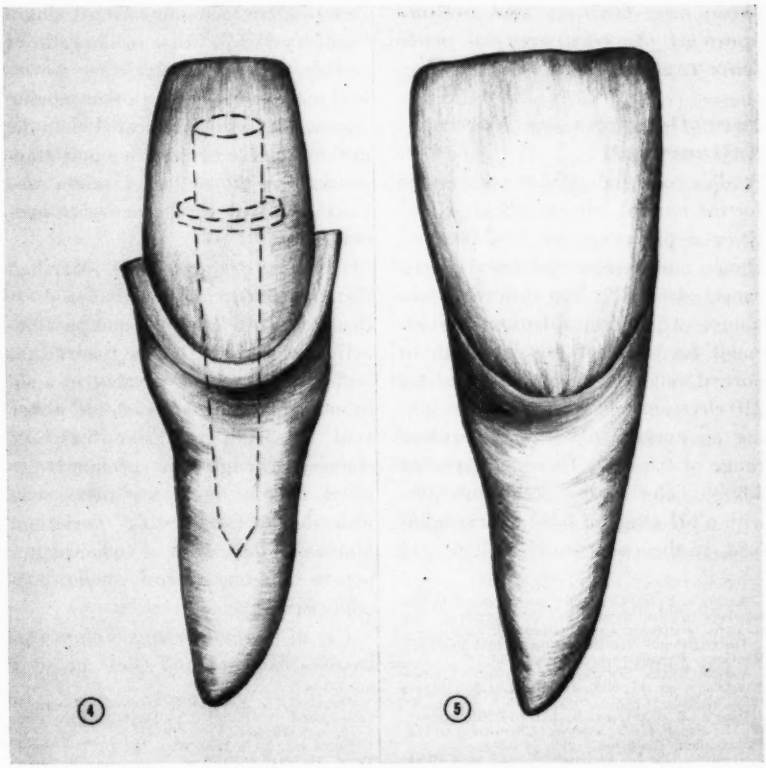


3. ***Tooth built up with self-curing acrylic.***
3A. ***Silhouette view showing dowel and acrylic.***



4. ***Preparation of acrylic for reception of jacket crown.***
5. ***Shows finished crown in position.***

SALIVARY pH

and TOOTH PROTECTION

LEAH M. PROUTT, B.S., M.S., Baltimore

DIGEST

Experimental evidence presented within recent years has revealed much information concerning salivary gland physiology. Several important facts long suspected by early investigators were substantiated experimentally within the last decade. In an examination of published work on salivary pH, some controversy regarding pH and tooth protection was noted; a more careful review of the pertinent literature was deemed essential. An attempt is made in this article to integrate these new findings and include some of the controversial problems reported.

Investigations on Normal Salivary pH

Studies have indicated a wide range for the normal salivary pH. Starling[1] gives a pH range of 6.4-7.00, and Hawk, Summerson, and Oser[2] give a range of 6.0-7.9. The different techniques of pH determination may account for some of this variation in normal values. A recent review[3] cites 210 electrometric determinations, giving an average pH of 6.78, with a range of 6.6-6.99. These authors cite 4,800 colorimetric determinations with a pH range of 6.0-7.8, averaging 6.84. In their own study of 3,367 pH readings, using indicator paper on 38 persons, their range is 5.2-8.4, with a mean of 7.31. The decrease in the range as one progresses from indicator paper to electrometric technique may be significant.

Factors Contributing to Fluctuation—Methods of stimulating salivary flow, collecting the saliva, time and temperature of sample storage, and psychic influences are all possible contributing factors to the wide normal fluctuation.

Resting Variable Studied — Marshall[4] concluded that normal "resting" salivary pH was too variable to be a positive factor in caries. Using a "salivary factor," that is, the ratio of resting salivary neutralizing power vs. activated salivary neutralizing power, his results indicated that the greater reserve neutralizing power appearing in the activated saliva was associated with the lower caries incidence.

Buffering Capacity — Marshall double-titrated the fresh buffered saliva from both "resting" and paraffin-activated subjects, on the theory that buffering capacity is greatest in a solution where the addition of either acid or alkali produces the *least* change. Though his groups were small, and the range was necessarily wide due to the "resting" variation, Marshall's data were of sufficient import to elicit one paper devoted to specific criticism.

Use of Normal Resting Values Opposed—Shephard and Gies[5] posed a valid criticism to one of the indicators, phenolphthalein, used by Marshall and strenuously opposed the use of the fluctuating normal "resting" values as a basis for calculation of his salivary factor. There is no question that the variation decreased the significance of the range of values reported, but the difference upon which Marshall commented was in the range of 20-25 per cent, sufficiently large to cover considerable variation error.

Conclusions of Critics—Shephard and Gies concluded that Marshall's data indicated the ratio between proportionate amounts of basic matter (buffering material) in the activated and the "resting" saliva. The importance of this indication to the knowledge of the physiologic process of salivary buffering was a valid contribution and certainly of greater importance than the suggestion of its role in dental caries.

Confirmative Evidence—The work of Karshan, Kransnow, and Krejei,[6] using CO_2 capacity, in 1931, Forbes[7] in 1932, and Hubell[8] in 1933 provided strong evidence toward confirmation of the protective role of stimulated salivary neutralizing power in dental caries, as previously prophesied by both Marshall and Pickerill.[9]

Two Essential Links Demonstrated —The fundamental contribution of Sand[10] in 1951 demonstrated the production and secretion of $NaHCO_3$ by the stimulated salivary glands, thus verifying the source of the reserve

Author's Note: Gratitude is expressed to the members of the Department of Physiology for opinions, criticism, and assistance.

*International Association for Dental Research Meetings, Philadelphia, March, 1953.

[1]Lovatt Evans, Sir Charles: *Starling's Human Physiology*, ed. 11, Philadelphia, Lea & Febiger, 1952, p. 842.

[2]Hawk, R. B.; Oser, B. L.; and Summerson, W. H.: *Practical Physiological Chemistry*, ed. 12, Philadelphia, Blakiston, 1949, p. 307.

[3]Hoskins, D. J.; Richards, J. Q.; and Plint, O. A.: A Study of Hydrogen Ion Concentration in the Mouth, J. Dent. A. South Africa **5**:375 (Aug.) 1950.

[4]Marshall, J. A.: The Neutralizing Power of Saliva, and Its Relation to Dental Caries, Am. J. Physiol. **36**:260 (Feb.) 1915.

[5]Shephard, L. A., and Gies, W. J.: The Validity of Marshall's Salivary Factor for Biochemical Determination of Susceptibility to, or Immunity from Dental Caries, J. Allied Dent. Soc. **11**:275 (March) 1916.

[6]Karshan, M.; Krasnow, F.; and Kregei, L. E.: Blood and Saliva Study in Relation to Immunity from and Susceptibility to Dental Caries, J. D. Res. **11**:573 (August) 1931.

[7]Forbes, J. C.: Effect of Meals, and the Chewing of Paraffin and Gum On the Acid-Neutralizing Action of Saliva, J. D. Res. **12**:749 (Oct.) 1932.

[8]Hubbell, R. B.: Chemical Composition of Saliva and Blood Serum in Children in Relation to Dental Caries, Am. J. Physiol. **105**:436 (Aug.) 1933.

[9]Pickerill, H. P.: *The Prevention of Dental Caries and Oral Sepsis*, ed. 3, London, Baillière, Tindall and Cox, 1923, p. 133.

[10]Sand, H. F.: Source of the Bicarbonate of Saliva, J. Applied Physiol. **4**:66 (August) 1951.

buffering power indicated by Marshall. Sand also demonstrated the presence of the enzyme carbonic anhydrase (detected in saliva by Rapp, 1946) within salivary gland cells. The production of the buffer compound in activated saliva, and the presence of the enzyme necessary for fast buffering action established the two links essential for comprehension of the action and rate of the physiologic process.

Relation Between Buffering Capacity and Caries Incidence—Most of the investigators mentioned, with the exception of Sand, Hoskins, et al., presented evidence to indicate a positive relation between buffering capacity and caries incidence. Hubbell[8] used two groups of children, 15 caries-free and 17 caries-active, to determine salivary CO_2 capacity (Van Slyke) and titratable alkalinity, with salivary flow and other analyses. The CO_2 capacity of saliva from caries-free children was 44 per cent higher than in the carious; the titratable alkalinity was 24 per cent higher in the caries free group.

Variation of Buffering Capacity in Stimulated Samples—Rae and Clegg[11] determined buffering capacity on students' stimulated saliva by obtaining an exvivo pH reading with a Beckman glass electrode, then adding a standard volume of 9 cubic centimeters of N/100 HCl and plotting the pH change with each milligram added. The calculated slope of the curve of this pH change (y/x) was the buffering capacity. They found a fairly wide variation of buffering capacity in stimulated samples and no correlation with either salivary viscosity or lactobacillus counts.

Electrometer pH Determinations

Published values based on in situ electrometer pH determinations are few. Stephan in 1940[12,13] developed an antimony electrode usable on tooth surfaces (for example, the film plaque or mucoid coat) which he used with a calomel reference cell in a Coleman pH meter. The average variation was 0.15 units in a 4.0-7.0 range. He found in 23 cases the normal salivary range to be 6.0-7.8, and the tooth surface range 5.8-6.8.

Effect of Sucrose on Tooth Surface—After Stephan's subjects used a 10 per cent sucrose mouth rinse for one minute there was an average drop of 2.0 pH units (4.8-6.6) which required forty-five minutes for a return to normal pH. The hydrogen ion concentration on tooth surface following the same rinse of 10 per cent sucrose increased to a value of pH 5.0 within eighteen minutes and required two hours for return to normal.

Buffering Action Investigated — These values, though on a small group and with a fairly large inherent variation, indicated not only the hydrogen ion increase as an effect of sucrose on tooth surfaces, but also the rate of salivary buffering in the plaque in response to a sucrose solution stimulation.

Further Investigations—Buffering action at the tooth surface was further investigated by Stralfors[14] and Lefkowitz:[15] (1) Stralfors, using a glass dental electrode, found a normal pH range of 6.5-7.4 for the enamel surface. (2) Lefkowitz, using an antimony electrode on the dried and scraped tooth surface, reported a normal pH range of 6.15-7.20.

It is noteworthy that these ranges of normal tooth surface pH values differ but little from the normal mouth pH range of salivary values published.

Possible Source of Amino Acid

Dreizen, Reed, and Spies[16] have demonstrated that precipitated salivary mucin may serve as a source of essential amino acids for the oral lactobacillus acidophilus under enzymatic conditions favorable for hydrolysis of this glycoprotein.

Factors Involved in Variables — Clement's excellent survey of work on salivary mucoprotein[17] cited this constituent of saliva to be variable depending on glandular source, stimulus and purity. The chemical nature of the protein before and after carbohydrate linkage indicates the possibility of pH change in the dental plaque according to the concentration of the glycoprotein.

Further Investigation Needed — Many more investigations are needed for the confirmation of the plaque data. The importance of the pH readings *within* the tooth film of salivary mucin, and the rate of change of these values in vivo merit further studies for clarification of the role of the plaque in salivary buffering function.

Determinations on Unstimulated Saliva

Eisenbrandt[18] in 1940 made 1,552 salivary pH determinations on seven human subjects over the period of one year. A glass electrode was used on "unstimulated" saliva. The author states that air exposure had a negligible effect on salivary samples. The actual amount of difference is not given, nor an explanation of how *unstimulated* saliva is obtained.

Average Reported — Eisenbrandt reports an average salivary pH of 6.64, range 5.28-7.48, with a standard deviation of ± 0.25, and a standard error of 0.006.

Fluctuation Noted — Eisenbrandt found a seasonal fluctuation as well as a daily fluctuation in individual records, and significant differences from subject to subject in these fluctuations.

Determination Made on Infants

Bradley and Tilghman[19] reported a series of pH determinations on infants, using a special glass electrode in situ, and a Beckman electrometer.

Average Saliva pH—On twenty infants, one day old and less, an average salivary pH of 6.96, with a stand-

[11]Rae, J. J., and Clegg, C. T.: The Relation Between Buffering Capacity, Viscosity, and Lactobacillus Count of Saliva, J. D. Res., **28**:589 (Dec.) 1949.

[12]Stenhan, R. M.: Changes in Hydrogen Ion Concentration on Tooth Surfaces and in Carious Lesions, JADA **27**:718 (May) 1940.

[13]Stephan, R. M.: Intra-Oral Hydrogen Ion Concentrations Associated with Dental Caries Activity, J. D. Res. **23**:257 (August) 1944.

[14]Stralfors, A.: Studies of the Microbiology of Caries III the Buffer Capacity of the Dental Plaques, J. D. Res. **27**:587 (Oct.) 1948.

[15]Lefkowitz, W., and Singer, A. J.: The Effect of Urea and Diammonium Phosphate on pH of Tooth Surface, New York D. J. **17**:159 (April) 1951.

[16]Dreizen, S.; Reed, A. I.; and Spies, T. D.: Salivary Mucin as a Source of Essential Amino Acids for the Lactobacillus Acidophilus (Hadley), J. D. Res. **29**:774 (December) 1950.

[17]Clement, A. J.: The Chemical Composition of Salivary Mucin (Mucoprotein), J. Dent. Assoc. South Africa **6**:277 (July) 1951.

[18]Eisenbrandt, L. L.: Studies on the pH of Saliva, J. D. Res. **23**:363 (Oct.) 1944.

[19]Bradley, J. E., and Tilghman, M.: In Situ Hydrogen Ion Measurements of the Mouth, Esophagus and Stomach in Newborn Infants, Am. J. Dig. Dis. **19**:255 (August) 1952.

ard deviation of ±0.39, over a range of 6.15-7.72 was obtained. Twenty-two infants, one to two days old, showed an average salivary pH of 6.38, with an S.D. ±0.40, over a range of 5.43-7.36.

Possible Variables Lacking—The average figure in these studies, as well as the range, is interesting in view of the fact that at least three possible variants affecting salivary pH values in adults are lacking in this situation: (1) the absence of teeth, (2) psychic influence, and (3) ingestion or presence of food.

Arterial Blood pH Changes and Salivary pH Changes

It is now well known, by virtue of the work of Brassfield in 1944,[20] and Sand,[10] among others, that salivary buffer concentration does not parallel blood buffer levels as was once thought (Forbes,[21] 1931). Rapp,[22] in 1946 first experimentally demonstrated the presence of the enzyme carbonic anhydrase in saliva, and Anderson[23] found data on one human subject that indicated the correlation between buffering and rate of salivary flow, both important steps toward the present concept of an intraglandular source of rapid buffering capacity. Brassfield's basic investigation on dog salivary flow established the variable between arterial blood pH changes and salivary pH changes, and indicated the occurrence of increased gland cell hydrogen ion concentration in relation to increased salivary flow during an anoxic state. In consideration of this intracellular reaction, the investigators[9,24,26] who studied dietary effects on salivary pH made some interesting contributions.

Dietary Effects on Salivary pH—Pickerill[9] in 1909 carefully measured salivary flow from the parotid gland separately, and the sublingual and submaxillary together. His alkalinity index, the amount of alkali times flow per minute, indicated that acid substances (fruits and vegetables) were eleven times more stimulating to salivary flow and buffer production than bread, cake, and biscuits.

Stimuli Compared—In testing food with controlled taste stimuli, he found the strong taste, combined with acid, to be the greatest stimulus, and the weak alkali to be an actual depressant of salivary flow.

Controlled Acid Diet Experiment—In an eleven-day controlled acid diet experiment Pickerill demonstrated a steady cumulative rise in flow and alkalinity of saliva for five days, with a drop on the sixth and seventh day when normal diet was resumed, and then a return to the steady rise on the eighth to eleventh with resumption of the acid diet. These experiments and the interpretations thereof, now confirmed, were far in advance of the known physiology of that time.

Food Stimulus in Animals Studied—In 1923 Anrep and Khan[24] studied dog salivation in response to food stimulus, using a fistula of the submaxillary duct. They demonstrated that recovery of normal secretory rate after an excessive flow required as long as three days. The major change in the saliva during heavy flow was the gradually diminishing protein concentration as secretion continued. This effect on secretion rate by repeated stimuli was demonstrated also in the cat by Goldenberg[25] using direct electrical neurostimulation.

Three Types of Diet Studied—Over a period of two weeks, Forbes and Gurley[26] used three different types of diet on six human subjects: (1) high cereal, (2) high protein, and (3) fruit and vegetable. Their data demonstrated that high cereal diet tends to decrease salivary neutralizing power, while high protein and fruit and vegetable diets tend to increase the salivary buffering action. Their subjects were divided on a caries basis also: three immune, and three susceptible. The immune subjects had a high buffering action, while the susceptible subjects showed a lower buffering response.

Relation Between Tooth Surface and Saliva Implied—Consideration of dietary effect on salivary composition becomes even more important since the report of Sognnaes and Shaw[27,28] using radioactive phosphorus. The implication that a dynamic relation exists between tooth surface and saliva suggests consideration of the enamel as a living, hence changing, tissue.

Role of Saliva in Tooth Protection—Further support for the importance of the role saliva plays in tooth protection may be seen in Wright and Jenkins'[29] contribution. These investigators found a significantly greater volume of saliva, as well as four times as many intact leucocytes in eleven caries-free subjects as compared to sixteen caries-active subjects. The difference in saliva volume as well as in number of intact white blood cells could be an indication of a difference in chemical composition of the saliva, since intact leucocytes require certain specialized conditions in order to resist disintegration; for example, optimal osmotic pressure, protein concentration, and pH, to mention the most important.

The following results agreeing with the evidence for a rapid intraglandular source of buffering response were reported from our laboratory.[30,31]

Laboratory Report on Buffering Response*

1. Determinations of salivary pH on 195 students and laboratory personnel by use of an in situ electrode (Beckman) yielded an average "resting" value of pH 5.97, with a range of 5.73-6.15. The standard deviation was ±0.40, with a standard error of 0.02. These values had a histogram

[20]Brassfield, C.: Flow and pH Change of Submaxillary Saliva Associated with Variations in Acid-Base Equilibrium, Am. J. Physiol. **144**:43 (June) 1945.

[21]Forbes, J. C.: Dental Caries from a Biochemical Standpoint, J. D. Res. **11**:591 (August) 1931.

[22]Rapp, G. W.: Presence of Carbonic Anhydrase in Human Saliva, JADA **33**:191 (Feb.) 1946.

[23]Anderson, D. J.: The Hydrogen Ion Concentration of the Saliva II Relationship Between Hydrogen Ion Concentration and Rate of Flow of Saliva. J. D. Res. **28**:583 (Dec.) 1949.

[24]Anrep, G. V., and Khan, H. N.: Metabolism of the Salivary Gland V Process of Reconstruction of the Submaxillary Gland, J. Physiol. **58**:302 (March) 1923-1924.

[25]Goldenberg, E. E.: Mutual Influence of Secretary Stimuli in the Submaxillary Gland of the Cat. J. Physiol. **58**:267 (March) 1923-1924.

[26]Forbes, J. C., and Gurley, W. B.: Effect of Diet on the Acid-Neutralizing Power of Saliva, J. D. Res. **12**:637 (August) 1932.

[27]Sognnaes, R. F., and Shaw, J. H.: Salivary and Pulpal Contributions to the Radio Active Phosphorus Uptake in Enamel and Dentin, JADA **44**:489 (May) 1952.

[28]Sognnaes, R. F.: The Skin of Your Teeth. Scientific American **188**:38 (June) 1953.

[29]Wright, D. E., and Jenkins, N.: White Blood Cells in Saliva of Caries-Free and Caries-Active Subjects, J. D. Res. **32**:511 (Oct.) 1953.

[30]Oster, R. H.; Proutt, L. M.; Pollack, B. R.; and Shipley, E. R.: Salivary Buffering Capacity Measured In Situ in Response to the Acid Stimulus Found in Some Common Beverages, J. D. Res. **32**:676 (Oct.) 1953, Abstract.

[31]Oster, R. H.; Proutt, L. M.; Shipley, E. R.; Pollack, B. R.; and Bradley, J. E.: Human Salivary Buffering Rate Measured In Situ in Response to an Acid Stimulus Found in Some Common Beverages, J. Applied Physiol. **6**:348-354 (December) 1953.

of normal symmetrical distribution, indicating this group to be representative of random population in this respect. This method of pH determination indicates directly the salivary flow, as found by Sand.[10]

2. Salivary secretion responded with a prompt and significant buffering reaction to drinking carbonated, flavored, acid beverages, average pH 3.07 (Fig. 1). The rate of this buffering response was rapid: over 50 per cent of the 195 subjects tested buffered (returned to or above their normal salivary pH) within 12 *seconds*, and 96 per cent of the group had buffered in 2 minutes (Fig. 2). The presence of carbonic anhydrase in the salivary gland cells and the production of $BHCO_3$ by the salivary glands logically account for the extreme rapidity of this buffering response.

3. If the $BHCO_3$ H_2CO_3 buffer is responsible for 80 to 90 per cent of the total buffering power of saliva, as stated by Leung,[32] the enzyme presence completes the requirement for the rapid, flexible physiologic response.

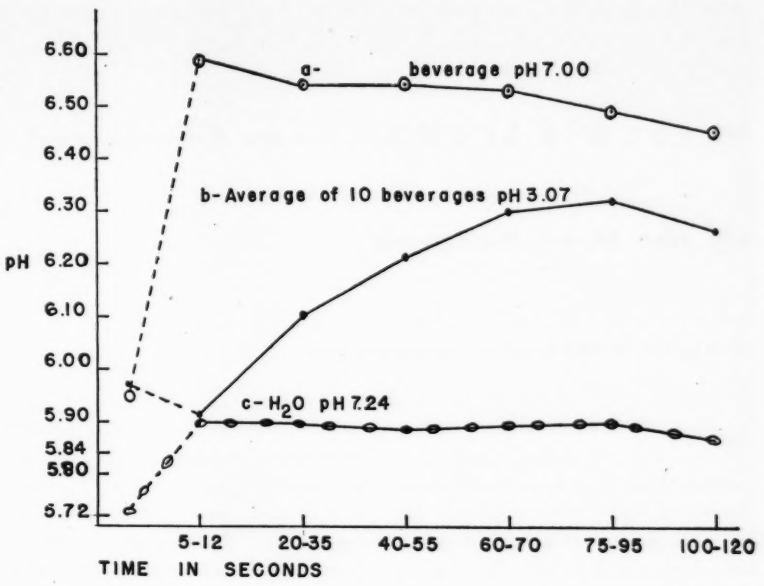
4. A consistently linear relation of approximately 20 per cent *slower rate* in this buffering response was demonstrated when heavy smokers were compared to the *total* group of smokers and nonsmokers. Nicotine depression of the salivary reflex has long been known.[9]

Conclusion

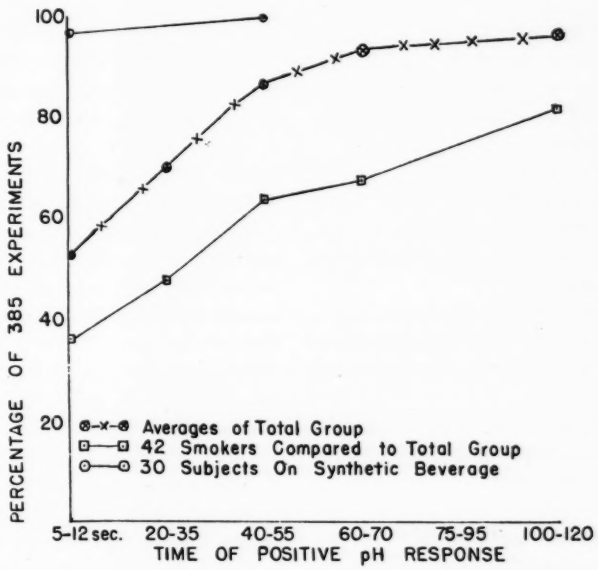
All of the literature reviewed emphasizes the importance of salivary flow. Some reports definitely indicate the degree of importance of saliva in tooth protection. Salient evidence for this conclusion as well as for some basic facts of salivary gland function are presented. How these facts may be utilized to achieve active protection against tooth destruction, as in dietary controls, remains to be revealed by much needed future investigation.

Department of Physiology,
University of Maryland
School of Dentistry.

[32]Leung, S. W.: Demonstration of the Importance of $BHCO_3$ as a Salivary Buffer (Abstract) J. D. Res. **29**:666 (October) 1950.



1. ***Time of salivary buffering response on 195 subjects.***
Curve a: Salivary buffering response to consumption of a synthetic flavored beverage, pH 7.00.
Curve b: Group means of salivary pH values following ingestion of 10 beverages with an average pH of 3.07.
Curve c: The salivary secretion response to drinking a nonflavored beverage, water, with a pH of 7.24. Statistical comparison of the curve slopes between 12 and 120 seconds demonstrates a significant difference between the experimental curve b and the control curves a and c.



2. ***Rate of salivary buffering response.***
The percentages of all the experiments plotted against time in which subjects returned to or above their own average normal salivary pH. The 42 heavy smokers demonstrate a consistently slower rate of buffering when compared with the total group of smokers and nonsmokers.

SPEECH FACTORS *to be Considered by the Oral Surgeon*

HOWARD E. KESSLER, D.D.S., Cleveland, Ohio

DIGEST

Although speech has always been the most important medium for the communication of ideas, it has been until recently one of the most neglected and misunderstood faculties. It has been suggested that the reason for past lack of knowledge about normal speech production is the fact that there is no organ in the human body which can be classified specifically as a speech organ. The muscles which form the power or "bellows" of the voice are muscles which are needed to sustain life in breathing; the articulatory muscles are primarily muscles of mastication; even the vocal cords are apparently intended primarily for the protection of the trachea.

Since the condition of the oral cavity is one of the chief factors in speaking, almost all oral surgical procedures affect, either constructively or adversely, the production of normal, intelligible human speech. For this reason awareness of the mechanics of speech production by the oral surgeon is of extreme importance.

Oral Procedures Affecting Speech

Where the oral surgeon is concerned, speech can be affected by the following procedures:

(1) Extraction of teeth
(2) Tongue tie
(3) Cleft palate repair
(4) Correction of "insufficient soft palate"
(5) Mandibular osteotomy
(6) Surgical correction of ankylosis of temporomandibular articulation
(7) Removal of cysts or tumors from certain areas of the oral cavity

Extraction of Teeth

Since extraction patients usually return after surgery to the original referring dentist or prosthodontist for a prosthetic replacement of the extracted teeth, the resulting possible speech defect in extraction cases is not primarily the problem of the oral surgeon. In general, after the removal of any upper or lower anterior teeth it is possible for the patient to have a speech defect when producing sounds involving the letters S and Z.

Removal of Several Anterior Teeth—If the four upper anteriors or six upper anterior teeth are removed, the patient may experience difficulty with sounds involving S, Z, L, F, V, and Th.

Enlarged Air Spaces—The reason for difficulty in these situations is usually mechanical. It is largely a question of too great an enlargement of the air-escaping or air-rushing space between the arches while producing these sounds during speech.

Speech Returns to Normal—If the speech of the patient was normal before the extractions, it will almost always return to normal after the dentist constructs the proper type of prosthetic replacement.

Tongue Tie

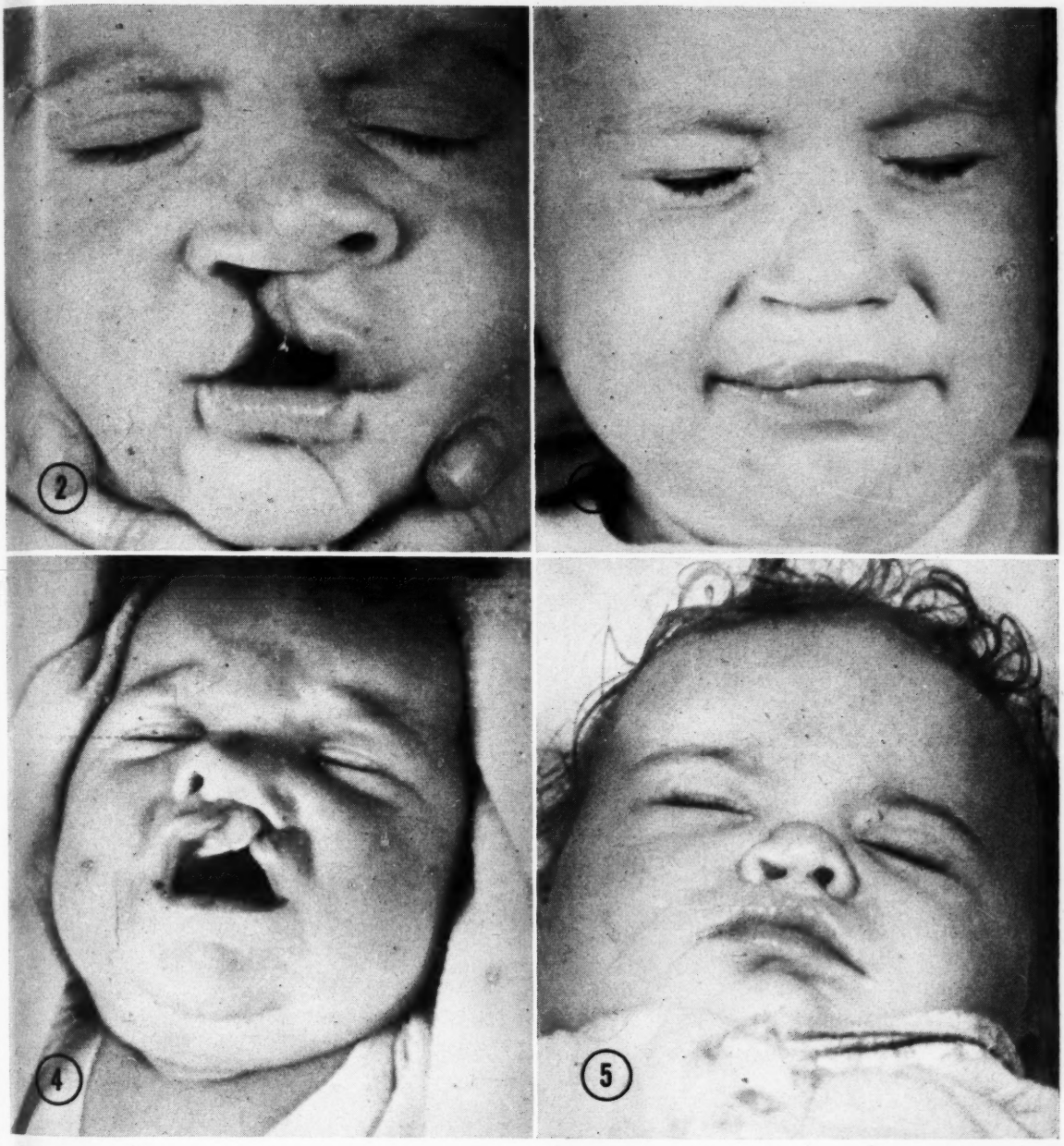
Tongue tie is no longer a serious problem because this condition is usually noticed before the child leaves the hospital and the frenum is operated on at an early age.

A child or adult, however, is seen occasionally whose lingual frenum anchors the tip of the tongue to the floor of the mouth so tightly that in making the *Th* sound the subject cannot reach the tongue tip between the anterior teeth of the opposing arches.

Cleft Palate Repair and Correction of "Insufficient Soft Palate"

Patients with cleft palate and those with "insufficient soft palate" are mechanically unable to make any sounds correctly except *M*, *N*, and *Ng*. The reason for this is that during normal speech production the nasopharyngeal space is closed (that is, the end of the soft palate at the uvula touches the posterior wall of the pharynx at Passavant's pad) in all sounds of the English language except *M*, *N*, and *Ng*. In the production of these

1. *A case of "insufficient soft palate."*



2 *and* **3.** ***Cleft palate and lip, preoperative and postoperative views. (Courtesy of Edward Reiter, D.M.D., Director of Cleft Palate Clinic, Mt. Sinai Hospital, Cleveland, Ohio.)***

4 *and* **5.** ***Preoperative and postoperative view of cleft palate and harelip case. (Courtesy of Edward Reiter, D.M.D., Director of Cleft Palate Clinic, Mt. Sinai Hospital, Cleveland, Ohio.)***

three sounds the soft palate drops down toward the base of the tongue and the isthmus between the nasal cavity and the pharyngeal cavity is kept open.

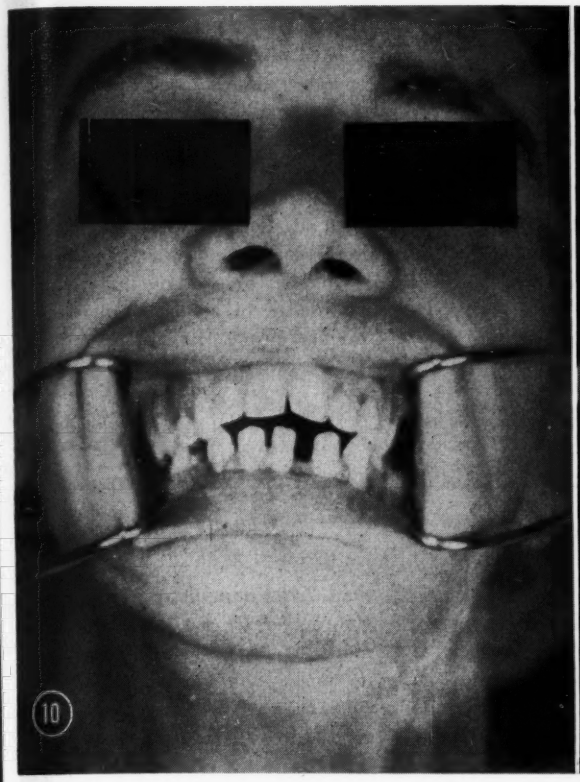
Common Result of Cleft Palate Surgery—From the standpoint of speech the most common and most disastrous result of cleft palate surgery is the so-called "insufficient soft palate" (Fig. 1). There are many cases, however, in which oral surgeons gave normal length to the palates but the patients retained their defective speech because the palates were too stiff and inelastic.

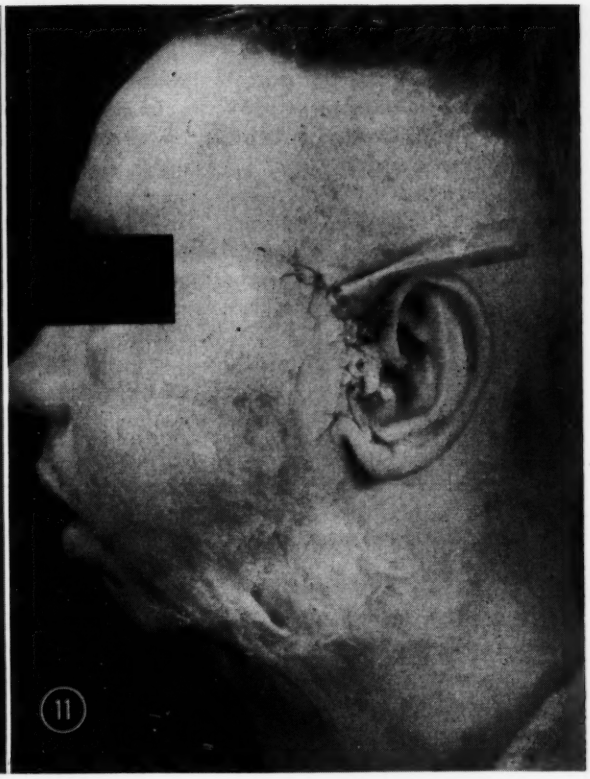
Cleft Palate and Harelip—Cleft palate is often associated with harelip but not always. In other words, a patient can have a harelip and/or cleft palate (Figs. 2, 3, 4, and 5).

Removal of Part of Soft Palate—Occasionally the oral surgeon is called upon to perform "push back" surgery on a patient who has "insufficient soft palate" due to accidental removal of a part of the soft palate during a tonsillectomy. The defective speech causation in these cases is for the same mechanical reason as that in

6 *and* **7.** *Before and after surgical correction of a protrusion case. (Courtesy of Edward Reiter, D.M.D., Chief of Department of Oral and Maxillofacial Surgery, Mt. Sinai Hospital.)*

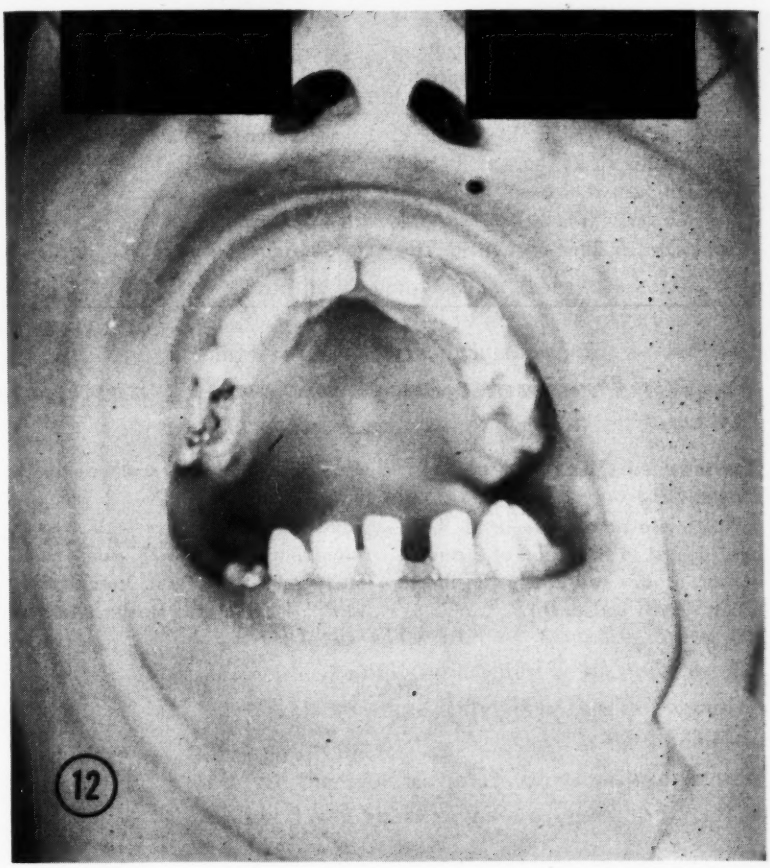
8 *and* **9.** *Preoperative and postoperative views of a protrusion case. (Courtesy of Edward Reiter, D.M.D., Chief of Department of Oral and Maxillofacial Surgery, Mt. Sinai Hospital, Cleveland, Ohio.)*





10. ***Case of ankylosis showing the patient opening the mouth as wide as possible.***

11. ***Immediately after surgery to correct ankylosis. The drain is shown in place.***



12. ***Showing how the patient can open the mouth after corrective surgery has been completed. (Courtesy of Edward Reiter, D.M.D., Chief of Department of Oral and Maxillofacial Surgery, Mt. Sinai Hospital, Cleveland, Ohio.)***

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the congenital cleft palate cases.

Mandibular Osteotomy

The speech of severe protrusion cases is usually quite indistinct and the speech defects do not follow a definite pattern as they usually do with the Class 2 type of malocclusion (Figs. 6, 7, 8, and 9).

Ankylosis of Temporomandibular Articulation—Due to the inability to open the mouth the speech of these persons is almost always defective. They literally "talk between their teeth." After surgical correction, however, the speech usually returns to

normal without speech therapy (Figs. 10, 11, and 12).

Removal of Cysts or Tumors from Certain Areas of the Oral Cavity

Speech defects from these causes usually come into three classifications:

(1) Loss of resonating areas
(2) Interference with tongue placement areas
(3) Enlargement of air-rushing space

Resonance Reduced—The removal of a large tumor from the maxilla can change the resonant quality of the voice.

Change in Contour—If a cyst is removed from the area lingual to the upper anterior teeth, the change of contour in this area can result in an articulatory difficulty.

Enlargement of Air Space—Surgery which changes the air-rushing space between the arches can produce a sibilant speech defect.

Conclusion

Although in general most speech defective patients are successfully treated by full cooperation among the speech therapist, dentist, physician, and orthodontist there are many cases which for best results require that the oral surgeon be included in the cooperative team. In addition, the fact that nearly every oral surgical procedure can affect speech in one way or another suggests the importance of knowledge of speech production on the part of the oral surgeon.

The Park Building, Public Square.

Sparks from the Teeth

J. G. BOURNE, London

H. NEWTON-ANDREWS made a valuable contribution when he reported the astonishing fact that he had seen sparks when the dentist's forceps slipped during the extraction of a tooth. I was therefore grateful to H. J. V. Morton when he suggested to me that he would, if I wished, investigate experimentally this unforeseen danger. Morton's experiments have already shown that sparks, visible in the dark, may quite easily be struck with certain dental forceps from extracted teeth, whether dry or wet and whether filled or unfilled. This observation has been confirmed by J. D. Robson, the dental surgeon at Salisbury with whom for some years I have been investigating the use of cyclopropane anesthesia for extraction work. Morton has also shown in three patients that when anesthesia was induced with a 50 percent mixture of cyclopropane and oxygen in the manner I have advocated a sample of expired gases, even up to the sixth exhalation after withdrawing the anesthetic, could be ignited by an electric spark.

Perhaps it is luck that in more than 2,000 administrations of cyclopropane for the extraction of more than 5,000 teeth I have had no mishap; or perhaps it is because the energy of these incandescent particles is not quite sufficient to detonate the explosive mixture. However that may be, it is now abundantly clear that this form of anesthesia for extraction of teeth must at present be considered dangerous and abandoned until the matter has been more fully investigated.

Adapted from Correspondence, *British Medical Journal* No. **4867**: 937 (April 17) 1954.

Cavity Preparation With or Without Airbrasive

Answer to Question on Page 394

No. 1 is a preparation made by a local dentist in the labial of a central incisor. It was restored with silicate which served satisfactorily for many years. The tooth was removed due to periodontal disease. No. 2 was prepared after extraction with No. ½ round bur, hoe 12-5-23, and enamel hatchets 15-8-14 R & L. Nos. 5-6-9-10 were also prepared with burs and chisels and are sections from different levels of the same tooth. The rest were excised in the laboratory with airbrasive.

The EDITOR'S Page

ALTHOUGH the lesion of dental caries, the end point of the disease, is a local event, there is increasing evidence that the precursors and predispositions to caries are explainable in a larger biologic framework. Caries can scarcely be called a purely local disease when it is generally considered that the quality of the calcification of the enamel is an important factor in the degree of the susceptibility to the disease. The enamel so influenced during development as to be more resistant to acid disintegration in later life is an example of a larger biologic pattern. It is upon this point that the proponents of fluoridation base their arguments. Their point of view is that by some mechanism not well understood the developing enamel bathed in tissue fluids enriched by the fluoride ion is made more resistant to caries attack in later life.

It has been suggested that the increased resistance of the fluoridated tooth to carious attack represents more than a tooth that has been structurally "hardened" during development. Muhler and Shafer write:[1]

"Rathje postulates that the resistance to dental caries afforded by fluorine and the relationship of salivary flow to dental caries are intimately related. It is his opinion that the reduction in dental caries produced by fluorine may be medicated through the thyroid gland by increasing salivary flow. Other work also has indicated a relationship between the activity of fluorine and the thyroid gland."

Virtually all clinicians are agreed that the type, the viscosity, and the amount of saliva are factors in caries susceptibility. The thick viscid saliva is usually associated with increased susceptibility. The free-flowing, more watery secretion is associated with reduced susceptibility. The ability of the saliva to neutralize the acid end products of bacterial activity is probably the most important single factor in caries immunity.

If the saliva flow is increased when the general metabolic rate is increased one would expect *less* caries in cases of hyperfunction of the thyroid gland and *more* in cases of hypofunction. To test this hypothesis Muhler and Shafer performed an experiment on 175 rats divided into six groups:

1. Desiccated thyroid added to the cariogenic diet
2. Desiccated thyroid plus sodium fluoride added
3. Thiouracil (a thyroid inhibitor) added
4. Thiouracil plus sodium fluoride
5. Sodium fluoride alone added
6. The control group to which nothing was added to the food or water.

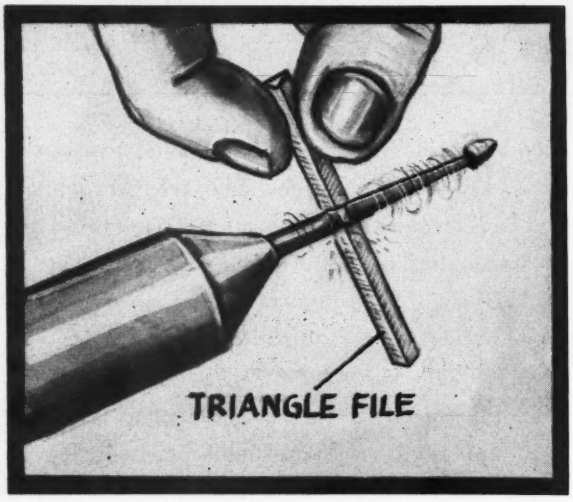
Among these groups the following end results were demonstrated:

1. Desiccated thyroid *reduced* the incidence of dental caries to the same degree as sodium fluoride alone.
2. Thyroid plus fluoride *reduced* the caries rate by 55 per cent more than thyroid or fluoride alone.
3. Thyroid inhibitor thiouracil, *increased* the caries rate.
4. Thiouracil plus fluoride, as contrasted to the group receiving thiouracil alone, was without effect on caries.

These investigators concluded: "Decreased thyroid activity is related to increased caries susceptibility in the rat. This evidence appears convincing that the activity of the thyroid is related in some manner to the incidence of dental caries in the rat."

The authors made no projection of their conclusions to include human beings. The passing thought does occur, however, that the thyroid gland may be sensitive to both iodine and fluorine. Increased thyroid activity by fluoridation might improve the caries experience by some kind of symbiotic action but this could possibly be harmful to the total mechanism. This question of the effects on the organism as a whole constantly reappears in the attempt to analyze the biologic implications of fluoridation. Within this territory we need many more facts than are now at hand.

[1] Muhler, Joseph C., and Shafer, William G.: The Effect of Feeding Desiccated Thyroid and Thiouracil on Dental Caries in Rats, *Science* **119**:687 (May 14) 1954.



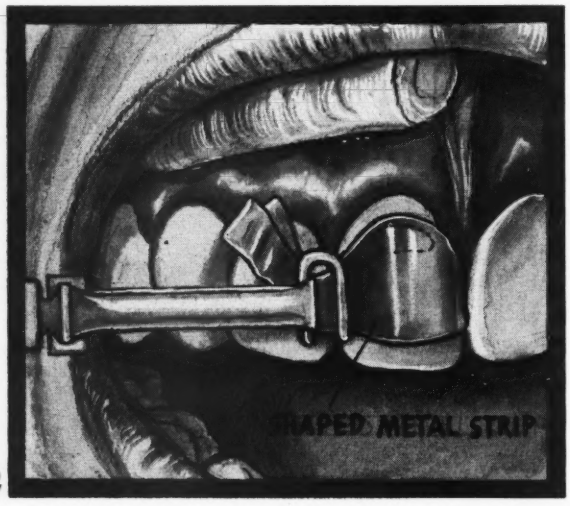
1

Clinical and Laborator

Identification of Carbide Burs and Diamond Instruments

David Lesser, D.D.S., Brooklyn, New York

1. Carbide burs and diamond stones may easily be distinguished from ordinary rotary cutting instruments by cutting a shallow groove on the shaft of the carbide and diamond instruments.

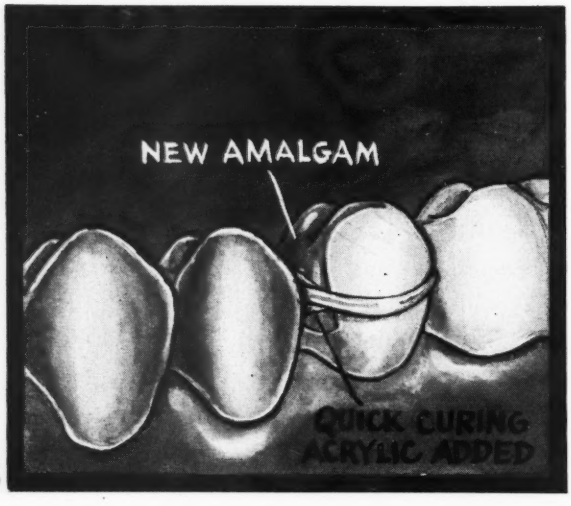


2

Acrylic Restorations for Anterior Teeth

W. S. Bardwell, D.M.D., Pullman, Washington

2. To place a plastic restoration in the labial surface without the porous effect caused by painting plastic, shape a strip of metal to the labial of the tooth and place over the plastic. Then encircle the tooth with a metal matrix band and tighten.



3

Reducing Shock Between a Gold Clasp and a New Amalgam

J. J. Beckner, D.D.S., Loveland, Colorado

3. After the amalgam has been placed and has been contoured to accommodate the clasp, quick curing acrylic is added inside the clasp. The clasp is seated and removed several times. The partial denture is put aside for the plastic to harden. The acrylic between the gold and the amalgam serves as an insulation to prevent pulp shock.

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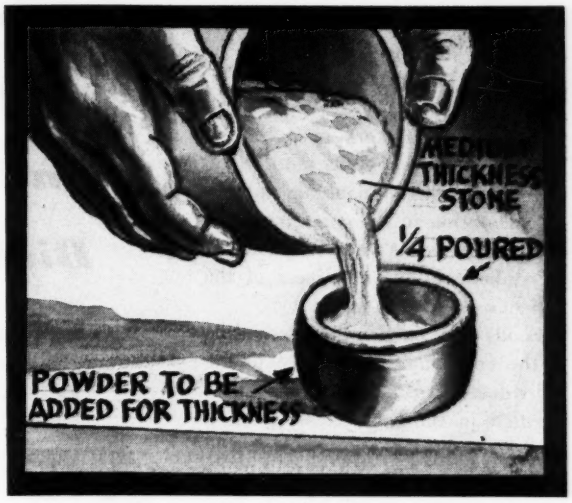
SUGGESTIONS . . .

Strengthening Teeth on a Stone Model

Herbert E. Rashkind, Long Island City, New York

4. Make a mix of regular thickness of stone in a large bowl. Remove ¼ of the amount of this mix and place in a small bowl until spatulation becomes extremely difficult. When placed in a vibrator this thick mix should flow freely into the tooth areas. The regular mix of stone is placed on a glass slab and forms the base of the model.

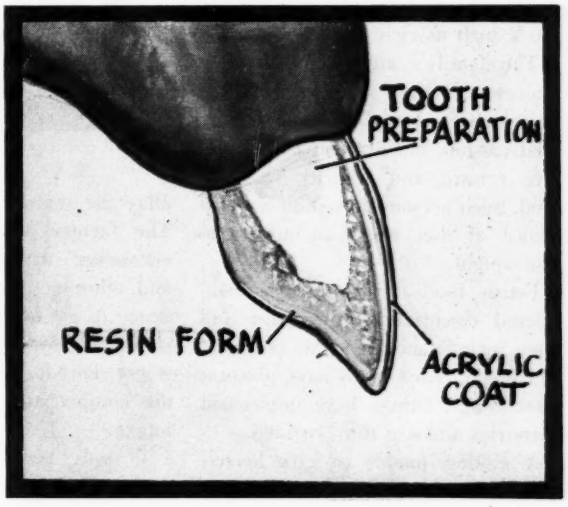


4

Temporary Acrylic Veneer Crown

Frank Sverdlin, D.D.S., Forest Hills, New York

5. Select a suitable resinous crown form. Paint the buccal or labial surface and part of the occlusal or incisal surface with fast curing acrylic of the proper shade. After the plastic is hardened, it may be polished with pumice and whiting.

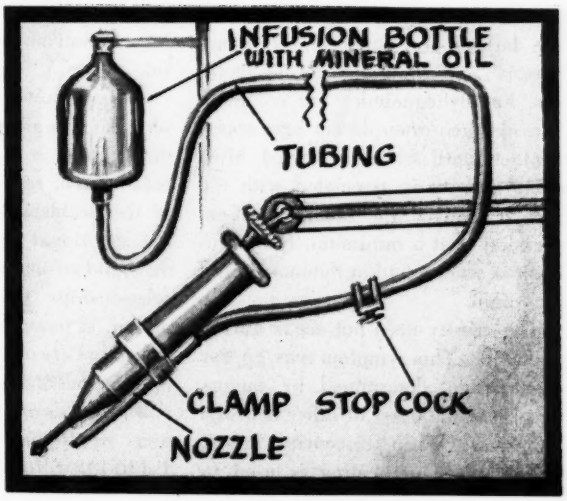


5

The Use of Mineral Oil to Reduce Frictional Heat

T. A. Del Papa, D.D.S., Galveston, Texas

6. Thick mineral oil that is colorless and tasteless may be used to reduce frictional heat during cavity preparation. A hospital infusion bottle may be used to hold the mineral oil. The parts of the apparatus are assembled as shown in the illustration. The oil is used in small amounts.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 426 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

MEDICINE and the Biologic Sciences

Disorders of Appetite

Psychologic factors may have a bearing on both obesity and excessive thinness. The nagging, intolerable sensation in the epigastrium often referred to as "nervous hunger" is symbolic of the emptiness of the patient's emotional life.

Foods may be classified according to the emotional significance to the individual person. Some foods may be used in times of stress to fill a need for emotional security. Milk and milk products may symbolize a desire to regress to childhood days when major decisions were made by the parents. The patient who feels unappreciated may eat special reward foods such as rich desserts.

The family's attitude on food is important. Often the patient will overvalue food and overeat if close relatives talk much about eating and give reward and security value to food. Such persons may show a weird choice of diet when attempting to lose weight.

Fetish foods are sometimes considered essential by the eater and often include such items as red meat and bread. Some foods have pleasant associations. Others have unpleasant memories and are thus avoided.

A mother unable to give herself lovingly to the children may try to use excessive foods in an effort to strengthen the children for life's battles. The children are overprotected and overindulged. In such families the fathers are usually weak, unaggressive and dominated by the mothers. Family squabbles are common. The children often do not have social contacts until school is started. Muscular activity is associated with the idea of danger and creative self-expression is at a minimum. Entertainment is often found in the movies and the radio.

The obesity need not occur during childhood. This symptom may appear at any age, determined by factors that cause the onset of other neurotic symptoms. When insecurity arises, anxiety develops; eating is used to allay the anxiety and obesity results. The factors producing the anxiety encourage withdrawal from social and other activities so that the tendency to get fat is increased. Dieting is difficult for these people because worry, boredom, or fatigue increases the amount and frequency of food intake.

In only rare cases is endocrine dysfunction a direct cause of obesity. The problems of (1) puberty, (2) pregnancy, (3) the climacteric, and (4) menstruation may lead to weight gains. The use of thyroid for reducing is unscientific and rarely successful.

The patient should have a thorough physical examination. If the nervous disturbance is of a temporary type, reassurance, sedation and discussion of the problem may be sufficient. If the emotional tension results from deep and strong influences, the family relationships must be further explored. If powerful unconscious mental factors are causative, a psychiatrist may be needed.

Weiss, Edward: Psychosomatic Aspects of Dieting, J. Clin. Nutrition **1**:140-148 *(March)* 1953.

Gynecologic Headache

Most women who seek advice because of gynecologic disturbances complain of headache. A proper interpretation of the symptoms may reveal the functional or organic disorder that brings the patient to the doctor. In general, there are four types of headache: (1) premenstrual, (2) menstrual, (3) menopausal, and (4) that caused by uterine malposition.

Immediately before the menstrual flow many women experience nervous tension, low abdominal discomfort and throbbing or pounding headache. A sense of fullness is felt about the head. The headache usually develops gradually during the four to six days before menstruation. Some relief is obtained in the first two or three days of flow. Thyroid deficiency is often suspected because many of these patients are overweight and sluggish.

The estrogen blood level gradually increases during the early part of the menstrual cycle. It persists until just before the onset of menstruation when the level drops rather suddenly. This change from estrogen to pituitary is believed to be the cause of headache for some persons.

Electrolyte imbalance is another mechanism that may produce headache. Weight gain by some women during the days just preceding menstruation is thought to be caused by increased retenton of sodium and water. This creates edema not only of visible body areas but also of intracranial tissues. As a rule cephalalgia results. Estrogen-pituitary imbalance is related to this electrolyte mechanism.

The pituitary dominance before the onset of menstruation persists for a variable time during and immediately after the flow and may continue to produce headache. When the headache is vertical the cause probably is electrolyte imbalance and water retention. Occipital headache usually results from hypoestrinism.

Psychogenic factors completely unrelated to any physiologic or anatomic disturbance may cause head-

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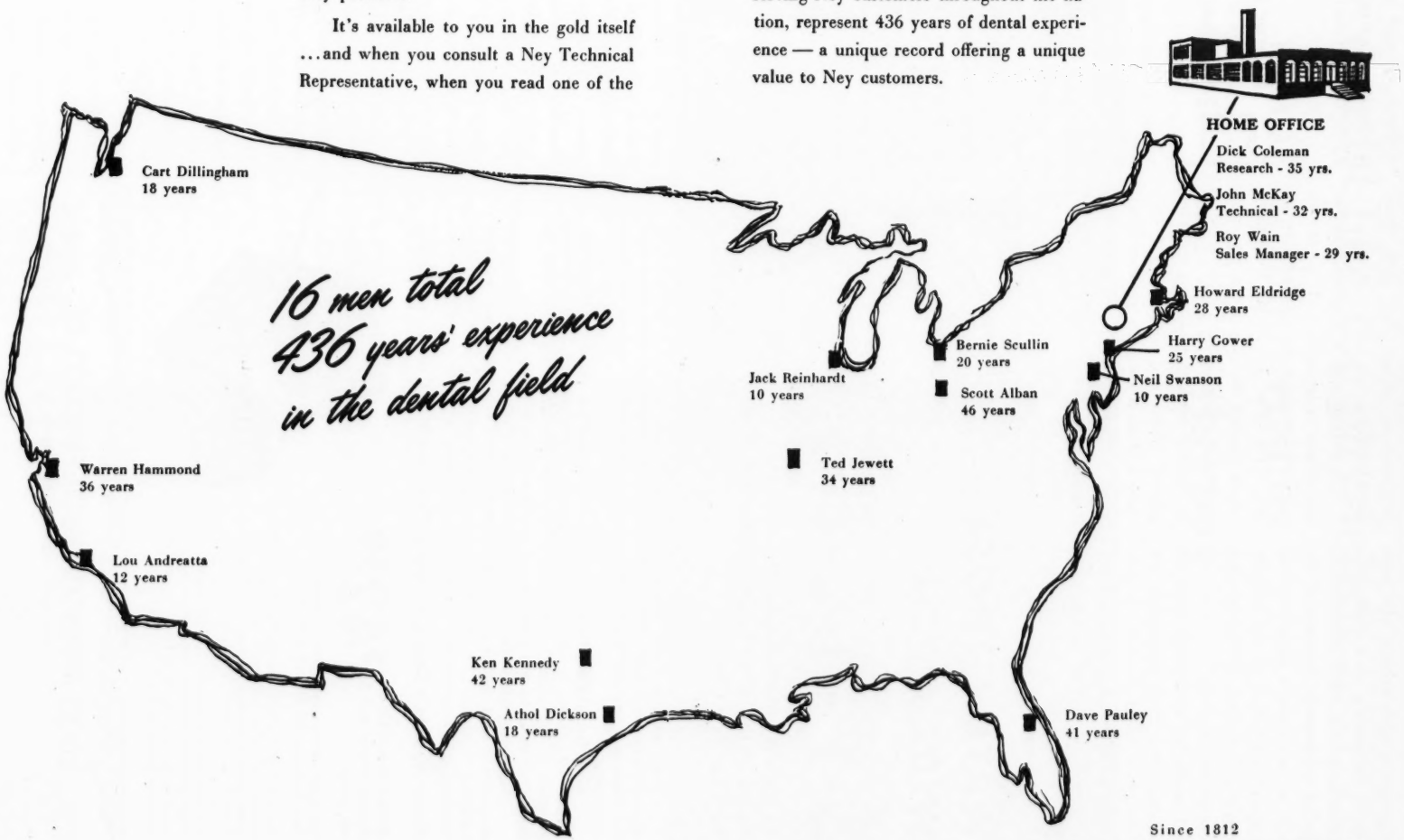

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ache. Psychogenic headaches are the most common with women who have a fear of pregnancy or a guilt complex recalling some early indiscretion.

During pregnancy, because of the high level of estrogen secretion and consequent inhibition of the follicle-stimulating hormone, headache may be completely absent.

The headache associated with the menopause has been commonly described as occipital. Severity is proportional to that of the vasomotor disturbances. Most women go through this period with no more than slight changes in equanimity or increase in nervousness, irritability, and emotional tension.

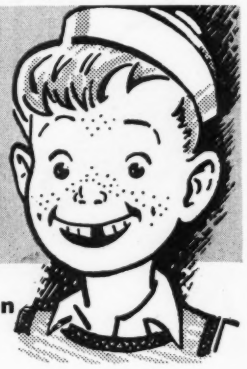
The patient with a displaced uterus sometimes complains of a severe stiffness or tightness at the base of the skull. The headache frequently starts toward the end of the day and is usually relieved by sleep.

Manual replacement of a retrodisplaced uterus and support by a pessary will soon confirm whether headache is caused by a malpositioned uterus. The headache, described as stiffness or tightness at the base of the skull, is usually relieved by sleep.

Hardy, Joseph A.: Gynecological Headache, Mississippi Valley M. J. **75**:66-69 *(February)* 1953.

WATCH THOSE WIDE OPEN

S-P-A-C-E-S



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Dental Bodies in the Lungs and Esophagus

One of the important aspects of endoscopic practice arises from dental foreign bodies finding their way into either the lung or esophagus. It is a small but extremely important aspect.

There are three main sources from which these cases originate: (1) In the first group a tooth or portion of a tooth, an inlay or restoration, calculus, a piece of plaster impression or a broken part of an instrument may slip from the grasp of the dentist and be aspirated or swallowed before the material is recovered. (2) Some patients permit their teeth and dentures to fall into a deplorable state of disrepair. During the act of eating or swallowing, for example, a portion of the denture is broken, swallowed and lodged in the esophagus. Endoscopic intervention is then necessary. (3) Occasionally teeth are loosened and sometimes lost as the result of manipulation of mouth gags and instruments during surgery in which a general anesthetic is used. This may occur in children undergoing tonsillectomy and adenoidectomy.

When it has been established that a patient has swallowed a dental foreign body, he should be carefully examined. Roentgenograms are most helpful, not only in demonstrating the presence and site of the foreign body itself but also in displaying the reaction of tissues surrounding the object. When barium is used in the esophagus, it may stop at the level of the foreign body and, in some instances, cling to part of it. A tooth lodged in the bronchus of a child frequently produces high fever and a persistent cough, as well as other signs and symptoms pointing to the presence of a foreign body in the lung.

Editorial: Dental Foreign Bodies

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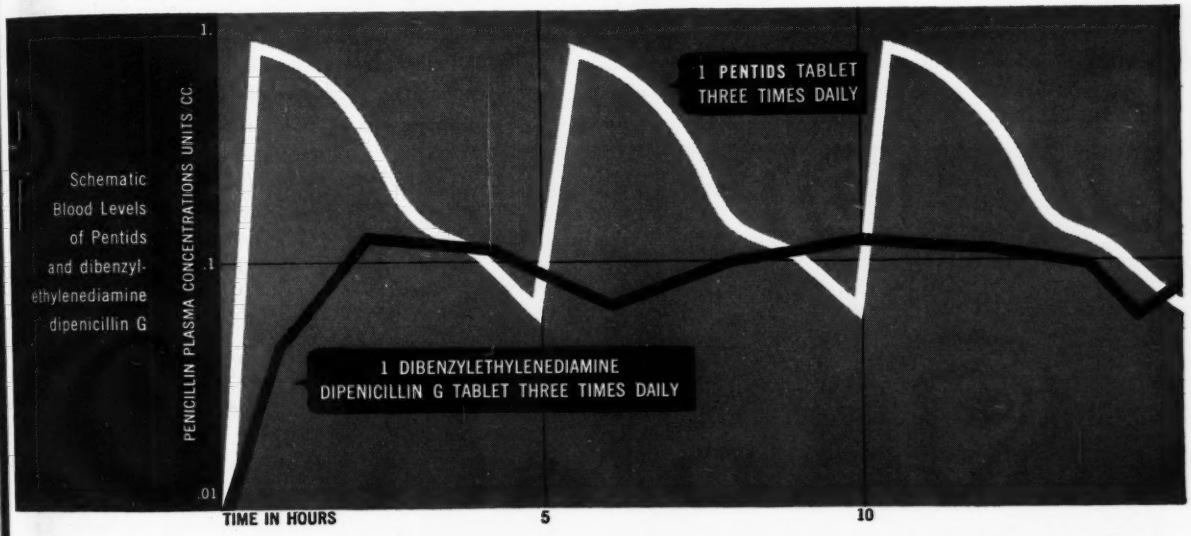

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in the Lung and Esophagus, JAMA **153**:35 *(September 5)* 1953.

Maxillary Sinusitis

The therapeutic management of maxillary sinusitis strives (1) to alleviate symptoms, (2) terminate infection early, (3) prevent complications, and (4) to decrease likelihood of recurrence.

In the early stages, treatment is limited to relieving pain and nasal blockage. Heat and packs containing mild anesthetics and shrinkage solutions are employed. Nose drops are of questionable value and should not be used more than briefly.

As acute congestion subsides, sinus lavage every three to four days is employed until a cure is accomplished. If infection persists, drainage should be improved by infraction of the middle turbinate or removal of polyps. Possible infection in the ethymoid sinuses and teeth should also be sought.

Occasonally parenteral antibiotics are effective aids to other therapeutic measures. They should not be used alone. Topical application of antibiotics into the sinuses has no appreciable value.

Persistent disease is usually caused by a blocking of the drainage passageways. In most cases the adjacent tissues rather than the ostium are at fault. To unlock the middle meatus, the turbinate may need to be infracted or turbinal cells obliterated. Allergy and other systemic disorders or infection may initiate and maintain an attack.

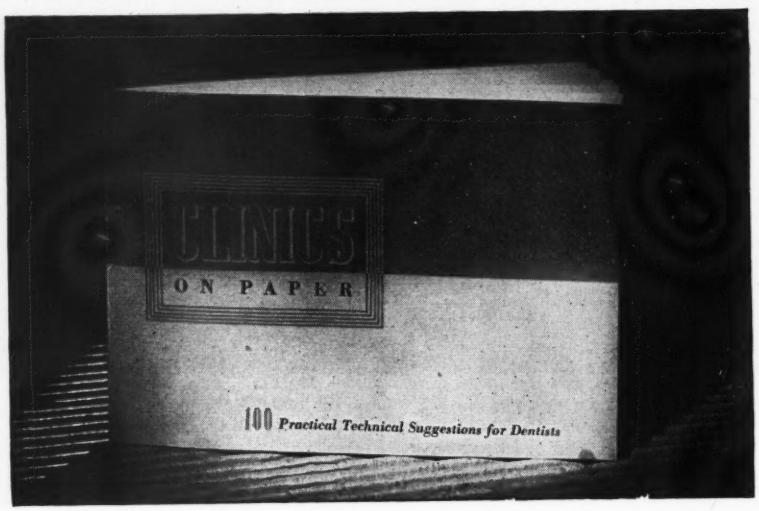
Lavage aids in diagnosis and may be repeated for therapy. The cavity is thus rid of toxic secretions and progress of the disease can be watched. Frontal and lateral roentgenograms made with iodized oil in the sinus help determine the thickness of the sinus mucosa. Mucosal edema recedes as symptoms improve.

Longstanding ostium constriction may be caused by a polyp in the ostium or in the sinus. It is most often the result of the general edema of the membranous lining of the cavity. In such cases, irrigation is worthless until an opening is made for drainage in the inferior nasoantral wall as near the sinus floor as possible.

Chronic maxillary sinusitis is suspected in the presence of the following conditions: (1) frequent colds, (2) nasal and postnasal drainage, (3) varying degrees of nasal obstruction, and (4) anosmia. A frankly purulent sinusitis may have had an allergic origin. Roentgenograms may show dental disease alterations in the lining mucosa but transitory changes may also appear in allergic states.

If the origin is dental and the condition does not resolve after removal of the dental infection, a large intranasal antrostomy usually suffices. Antral surgery is indicated for the vast majority of antroalveolar fistulas. The Caldwell-Luc operation is required in older and more complicated cases.

Radical surgery is now relatively uncommon. The two procedures in modern usage for chronic suppuration are (1) intranasal antrostomy, and (2) the Caldwell-Luc operation.



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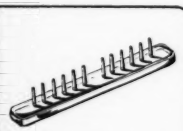

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Van Alyea, O. E.; Hill, Frederick T.; and Boies, Lawrence, R.: Symposium: The Modern Treatment of Maxillary Sinusitis, Tr. Am. Academy Ophth. **57**:180-192 *(April)* 1953.

Bunions

The cause of bunions has never been adequately established. Probably, they are a result of shoes that are too small, of stockings that are too short, and of heels that are too high. Bunions are seen more frequently in women than in men.

Sometimes bunions are seen in children. Conservative treatment may be tried in an attempt to correct the hallux valgus deformity. The deformity may be corrected conservatively by wearing shoes that are large enough—the shoes must be large. There should be room within the outline of the sole for the entire foot when pressure is placed on the shoe to simulate that of standing. Exercise to increase the strength of the adductor hallucis is advocated. Frequently, a night splint of the type that straightens the deformity is worn.

In adults there is no way to correct the hallux valgus deformity without operation. The only thing that can be done conservatively is to allay the pain of the deformity. If the pain is severe and there is a real bunion as evidenced by a bursitis, either infected or noninfected, it is most important to diminish the pressure on the bunion. This can be done (1) by cutting the slipper or shoe over the area of pressure, (2) bed rest, if necessary, and (3) if infection is present, by the use of antibiotics and warm soaks.

If there is merely chronic pain over the bunion, the most important conservative measure is to admonish the patient to change his or her shoes for others that are large enough. One other method is to have the shoe cut at the seam at the base of the sole, the upper part pulled back and then stitched back loosely over the bunion. In this way an old shoe that is not too small may be used.

The heel should be low for women, no higher than a cuban or a college heel. If a higher heel is worn, the body weight jams the foot down into the forepart of the shoe. The tendency for valgus deformity of the great toe is increased.

Another measure that provides relief is the use of a flexible plastic or latex appliance that covers the great toe and the area of the bunion. This appliance is built up thickly around the periphery of the tender bunion, thus diverting the pressure to a nontender area around the bunion. An appliance of this type must be made individually by an expert manufacturer.

Cozen, Lewis: Office Treatment of the Foot, Postgrad. Med. **14**:59-65 *(July)* 1953.

Infectious Hepatitis in Pregnancy

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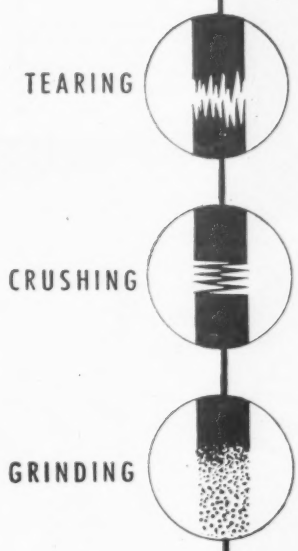

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to infectious hepatitis, a common viral disease. Usually the infection is transmitted by the oral-intestinal-fecal route. Transfusions of blood and plasma may also be responsible for its appearance. Many blood donors have chronic hepatitis without clinical symptoms. Some may even be carriers. The mere elimination of donors with a history of jaundice is inadequate as a preventive measure.

The true incidence of infectious hepatitis in pregnancy is unknown. However, indications are that it is fairly common. Many gastrointestinal complaints that are dismissed as functional or psychogenic may in reality be due to mild attacks of infectious hepatitis.

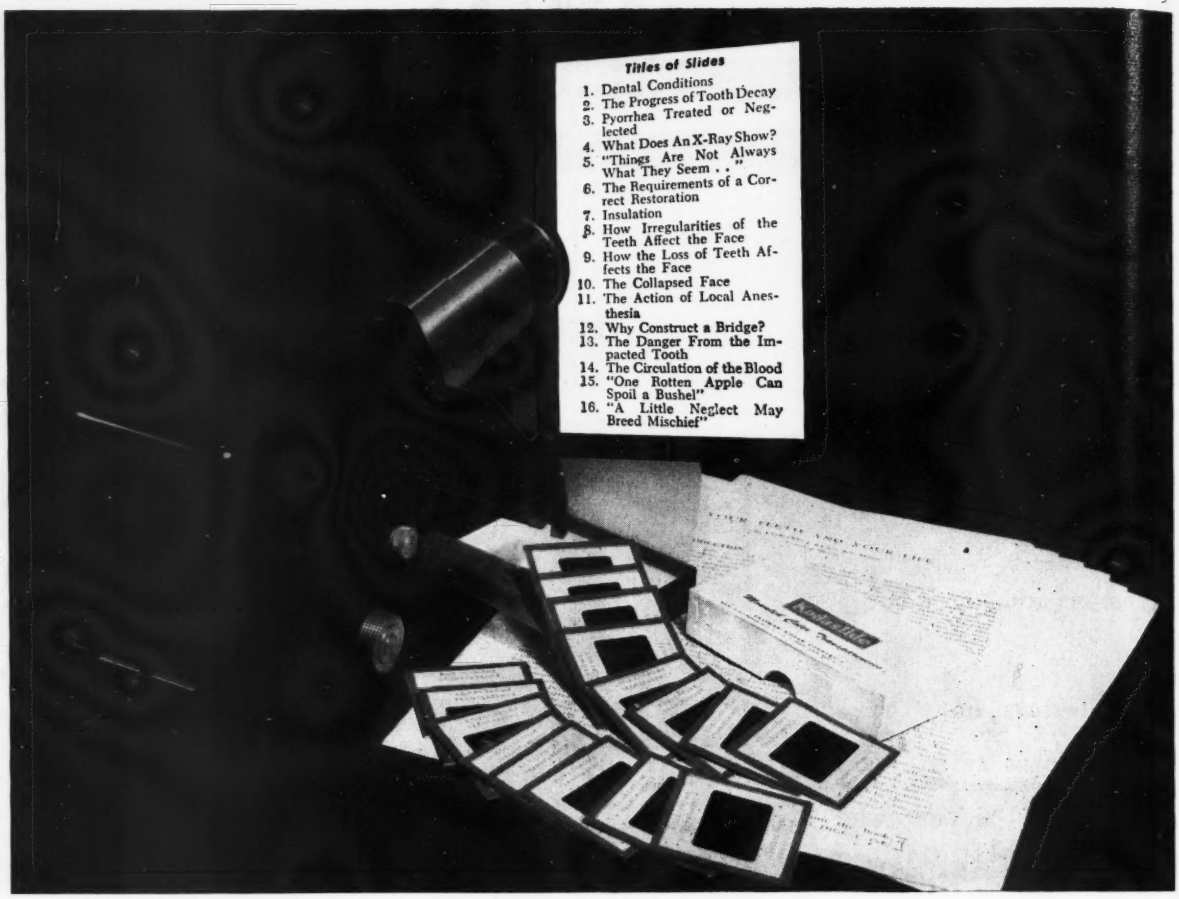
The course of hepatitis in pregnancy does not differ from its course in general. Recovery is usually complete. Spontaneous abortion and premature labor may occur as with any severe constitutional disease or prolonged febrile illness.

Interruption of pregnancy is contraindicated and additional stress resulting from operation, trauma, or anesthesia may prove fatal. A high protein and carbohydrate diet is essential and the intake of B-complex vitamins should be liberal. The prognosis is better for patients who have received an adequate diet before infection than for those whose nutrition has been poor.

The use of corticotropin may prove life-saving if surgical treatment becomes necessary. Gamma globulin gives passive immunity from infectious hepatitis and may also give a passive-active immunity; consequently, it might be used as a prophylactic measure during a known epidemic.

Attention to dietary, metabolic, and electrolytic requirements is the most important therapeutic consideration. There is no evidence to show that infectious hepatitis causes any anomalies or defects in the fetus.

Roth, L. G.: Infectious Hepatitis in Pregnancy, Am. J. M. Sc. **225**:139-147 (*February*) 1953.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7. Insulation
8. How Irregularities of the Teeth Affect the Face
9. How the Loss of Teeth Affects the Face
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Contra-Angles

Sylvester Catnip and the Game of Golf

On Sundays Sylvester slept late—for him. At 7:30 he left his small part of the bed that his wife Myra allotted him. He was not one to yank the covers off the bed and leap to the floor on two feet with abandon. Sylvester left his bed more like a snake shedding its skin, without noise or effort. He slid out from under the covers without a squeak of a spring or a cold draught on Myra's body which was usually exposed from the shoulders down. Her nightgown was up well around her torso like a life jacket on a sailor.

Sylvester went to the window and so his day began with a heavy heart. His window-washing chore of yesterday had been a gross failure. Window-washing was the passion of his heart. There before him were the streaks and blotches of yesterday that made unhappy designs as the sun shone upon them. These were patterns without beauty; they were nothing like the white lacy designs of frost that gave a clean feeling like seeing sun on a distant mountain top. The streaks were ugly projections like the tongues of serpents. The blotches reminded him of birth blemishes on a face that otherwise was a nice job. Sylvester was a sensitive soul about his windows.

Sunday is the only day when the street cars are leisurely and not trying to nudge everything off the tracks with the clatter of their bells. Even the conductors are a little more civil on Sunday and wait until a customer has both feet on the platform before jerking the bell cord twice. Mr. Catnip rode the street car to the end of the line. He never cared particularly what line or what end. He boarded the first car that came along Clark

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street and kept his seat until he was informed: "The end of the line, as far as we go."

On this Sunday the car had stopped in relatively open country. The continuation of the street led down a gravel road that was lined with trees and free from automobile traffic. This was spring and Sylvester was glad to see the sky again. He walked down the road kicking gravel on the grass and enjoyed the warm sun on his back. For the time he was free from his nagging worry about his repeated failures with his window washings. He was also glad to be free from Myra who had by this time moved her rump over to his side of the bed and would keep it there until late afternoon. Sunday and the other six days were intended for her rest.

About 10 o'clock Sylvester came to a golf course and stood at a fence to watch this game that he had never played. In fact, this was the first time that he had ever seen it played. The grass was smooth and green—in most places. Here and there they had run out of seed and sand showed through. Other places they had been pretty splotchy in the mowing; something like his own window washing. But some of the spots had been mowed so nice they looked as if they had been done with a razor. The players seemed proud of these spots because they were marked with flags and all four men seemed to come here and deliberate. Now and then one of the men would drop to one knee at one of these spots. Only one of the boys who seemed to carry the luggage was allowed on these green lawns and it seemed to be his job to hold the gay flag while the men worked hard to push the white balls into a gopher hole. After all four men had put their balls into the gopher hole it was the boy's job to reach into the hole and fish them out. He was surprisingly good at this because he had the white balls in his hand in no time. Then he put the flag back. A funny kind of an animal that needed a flag to show him his hole!

One of the men in the party seemed to be a bookkeeper. The first man said "six," the second, "five," the third, "four." The bookkeeper didn't announce his own number but replied, "I got a four, too," when one of the other men asked.

The boys who carried the luggage put the balls in a little box and apparently washed them with something because they rubbed them on a rag that was nailed to a stick. These boys were kind of acolytes as well as luggage carriers. Each man had his own assistant to hand him a ball and a stick out of the pack that the boy carried on his back. It appeared to Sylvester that the boys were mighty small to be carrying these heavy loads and the men were not helpful to them. Sylvester had heard that golf was exercise, but the assistants seemed to be getting more than the men.

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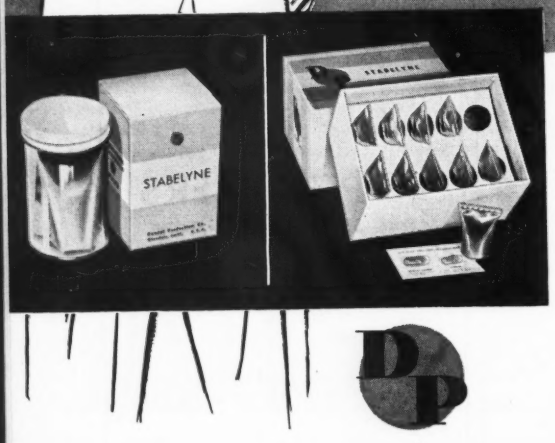

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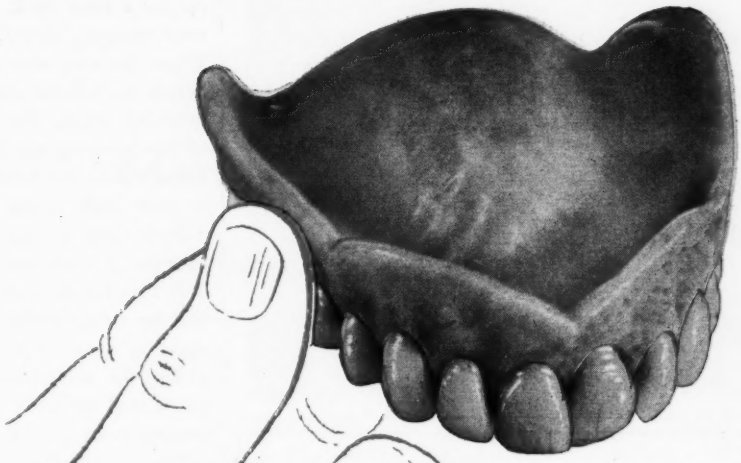

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(*See pages* 412 *and* 413)

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The bookkeeper was the first to step forward to strike the ball. The hitting was done from another green spot but not as nicely mown as the one with the gopher hole in it. The bookkeeper took the ball handed to him by his assistant and propped it up on a little stick. The other men were swinging their thin bats around. When the man who was to hit stood beside the ball the other men and the boys fell silent. The hitter did a lot of hip swinging and made many false starts before he finally hit the ball. It went high in the air. There was nobody there to catch it so Sylvester thought it must be a good one. It didn't go far in front of the platform and the hitter threw his bat after it, showing great anger. The assistant picked the stick from the grass and put it into the pack on his back. He seemed to be used to this procedure.

The other man who had said "four" stood up and began wriggling his hips in front of the ball. Seven or 800 feet down the lawn another player walked across the grass and a man who was squirming on the batting platform hollered "fore" at him. But this was a different kind of "fore" that he hollered when he called his score. The fellow on the lawn ran for cover behind a tree. The man hitting followed him with his shot and the ball went over into the woods and long grass, but not nearly as far as to the tree where the man was hiding. The players didn't think that this was funny, particularly the man who hit the ball. The assistants smiled slyly among themselves. Then the third man got up and went through the body contortions and false motions that the others had used. His ball went off to the left and fell into a sand pile that somebody had left on the grass. He didn't seem to be pleased either.

The fourth hitter was a runt of a fellow who made quite a ritual of rubbing his hands and polishing the handle of his bat with his handkerchief. He also had a worn and tattered glove on his left hand. This seemed silly to Sylvester on such a warm spring day. If something was wrong with his hand, why was he

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Steele's

straining it the way he was? This player didn't have as much to wriggle and twist around as the other players had, but he was a nervous one to adjust the peak on his cap. Finally he hit the ball and it went straight down the field about 200 feet.

From where Sylvester stood he had a hard time believing that these men were having fun. Everyone complained about the spot where his ball dropped. When they left the hitting platform they went their ways separately without a spoken word to each other. The assistants were silent fellows too. They reminded Sylvester of bird dogs the way they ran after the balls and stood over them until the men came up. The assistants handed out the sticks and stood silently as the men tried another hit. The man in the woods and the man in the sand pile were having the hardest time. The one in the woods seemed to be chopping the tall grass with some special kind of scythe that the assistant had pulled from the pack. The man in the sand whacked away at the ball four or five times. He blew sand over everything including himself but the ball slipped out from his little shovel every time. Finally he looked around carefully to be sure nobody was looking, and reached down and picked up the ball and threw it on the smooth grass that led to the next patch of real nice lawn where the flag waved. It was some kind of bet because he reached in his pocket and gave his assistant something. The man seemed to be amused because he lost the bet. He laughed and was very friendly with the boy who was helping him.

The two men in the short grass didn't seem able to hit their shots far—maybe 25 or 30 feet. Then they would try again.

The broad green path that the men were following ran parallel to the road so Sylvester walked along the fence watching the game. After walking in the long grass, through the woods, dipping into a couple of streams, and in and out of sand piles the men came to another beautiful green spot with the flag stuck in the hole in the ground. Now they came together again from their separate positions; nobody spoke or was friendly. Another boy pulled the flag out of the hole this time and the men worked hard and repeated what they had done on the other green spot where the gopher hole had been marked with a flag. After the assistant dug the balls out of the hole, the bookkeeper pulled his record card out of his hip pocket and growled one sharp word: "Scores!"

"Six," said the man who had been in the woods.

"Five," announced the player who had been working in the sand.

"Four," said the runt.

"Same for me," said the bookkeeper.

Nobody seemed happy about the result. Off they went to do the same thing over again.

—E. J. R.

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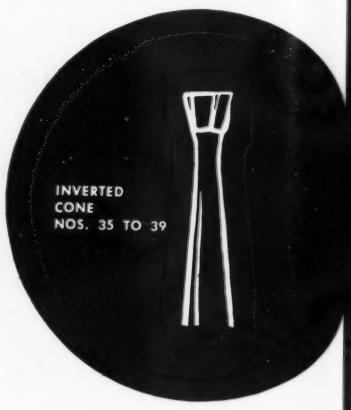

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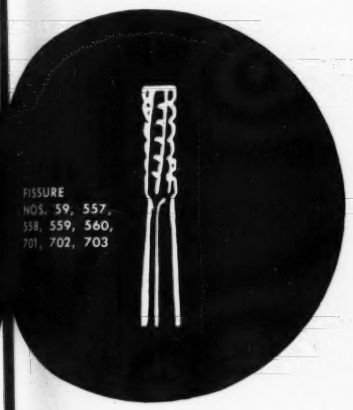

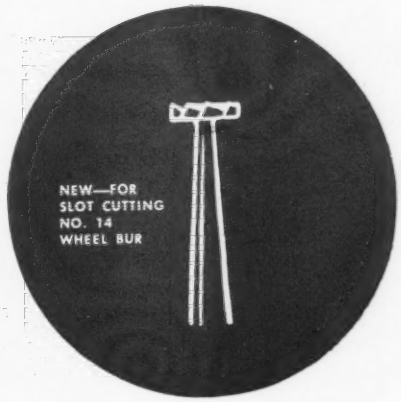

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Recurrent Herpetic Stomatitis—Characterized by "crops" of herpetic lesions (aphthae) which appear as discrete or confluent yellow ulcers with red areolae. The virus, which gained entry when the patient suffered primary herpetic gingivo-stomatitis (usually in childhood) becomes active whenever the resistance of the tissue is lowered by trauma or stress. Treatment is difficult and includes vitamin B complex therapy, aureomycin or terramycin locally or systemically, repeated vaccination or heavy doses of cow-pox vaccine and withdrawal diets. Any of these may be effective in a given patient. In some, the disease is refractory.

Periadenitis Mucosa Necrotica Recurrens—Resembles oral herpes but the borders of the lesions are raised giving a crater-form appearance and their course is longer. They do not respond to vitamin B complex, vaccination or antibiotic therapy. Hydrocortisone, used locally, shows promise in a few instances but judgment is reserved.

Desquamative Gingivitis—The result of a disturbance in the basement membrane and connective tissue ground substance. When it occurs it is usually associated with estrogenic dysbalance. The mouth should be freed of all local irritation and kept clean. The results of hydrocortisone and neomycin as a local ointment are interesting.

Chronic Atrophic Senile Gingivitis—Characterized by disturbed maturation of epithelium in older women. There may be areas of desquamation and of hyperkeratosis.

Lichen Planus—Found in the mouth more frequently without, than with, skin lesions. While the etiology is unknown psychosomatic factors are strongly suggested. The results of hydrocortisone and neomycin ointment are most encouraging but final judgment must be based on long-term observation. Chronic atrophic senile mucositis resembles chronic atrophic senile gingivitis in some respects and erosive lichen planus in others.

Adapted from *Proceedings of the Institute of Medicine of Chicago* **20**:125-126 (May 15) 1954.

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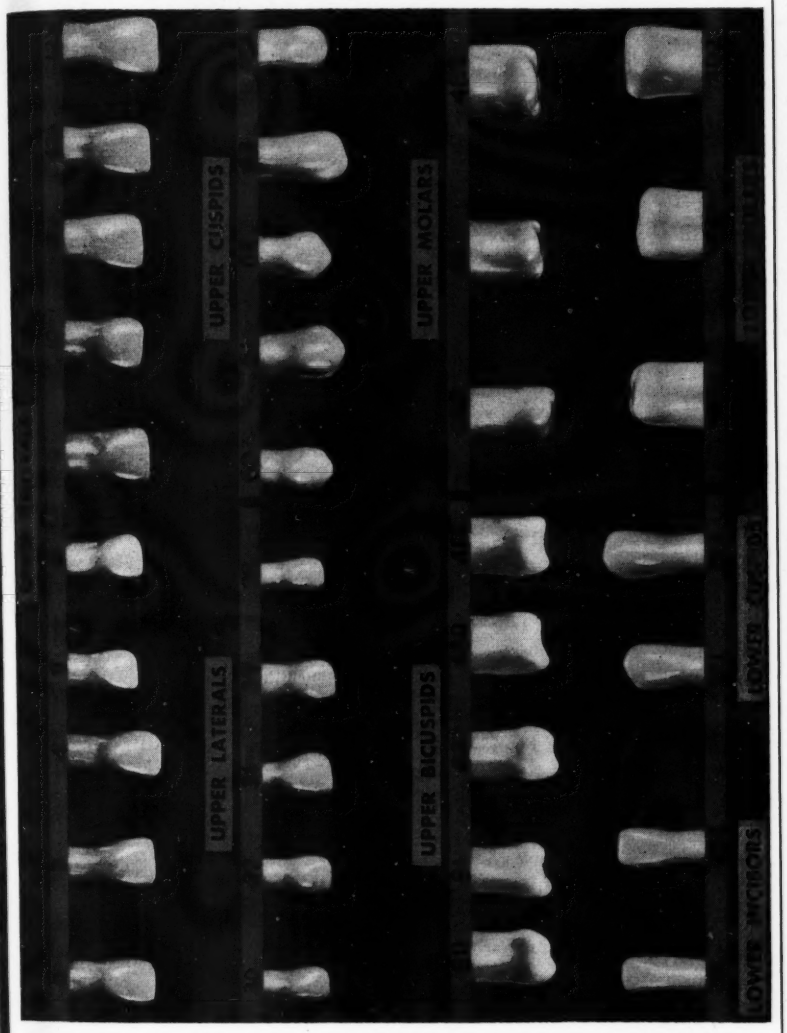

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With this question, Doctor Robert P. Stickley launches a discussion of finances that should be most interesting to dentists who think it is too soon—or too late— to start building a retirement fund. Even dentists who have already started such a fund may gain useful information from this article.

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"Is Your Assistant Leaving?"—We hope not, for, as Doctor Robert H. Brotman points out, it is difficult to replace a good assistant. "The requirements for a good assistant are more involved and complicated than many of us realize . . . Not many have the qualities of a diplomat and psychologist, besides being a bookkeeper, secretary, chair assistant, technician, maid, receptionist and mind reader." He explains how he tests applicants before hiring a new assistant.

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"Your Practice Can Be Hurt by Family Liability" warns Harold J. Ashe, in explaining the necessity of carrying insurance which will protect the dentist in event of accidents or injuries caused by a member of his family or occurring on his premises, Damage inflicted by pets is also covered by the liability policy.

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"Sidelights on 'Through Alaska's Back Door'" is the interesting commentary of Doctor Bernard Francis Ederer on his recently published book —a thrilling tale of a 3,400-mile canoe trip through waterways of the far north.

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Doctor Alan A. Axelband found it is not too difficult to treat bedridden patients in their own homes. He describes his first home case, and suggests that dentists not shy away from "Dental Treatment of Bed-Ridden Patients at Home."

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Sometimes the dentist can detect signs and symptoms of physical debility before the patient is aware that the condition requires the attention of a physician. Doctor Harold S. Jones describes cases from his own practice in the article, "The Mouth Is Part of the Body."

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"Why I Moved My Practice From My Home" is the story of a dentist's experience as told to Charles Fitz-Patrick. He reports that the dentist's family, health, and working efficiency profited from the change although net income reflected the additional expense of rent and transportation.

★ ★ ★

Don't forget the regular monthly departments: "Dear Oral Hygiene," "Dentists in the News," "Technique of the Month," "Ask Oral Hygiene," "So You Know Something About Dentistry!," "Picture of the Month," "Editorial Comment," "The Publisher's Corner," and "Laffodontia." All provide good reading.

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